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Flight and Operational Medicine Clinic Workflow Analysis

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Technical Report

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14. ABSTRACT
A front-end analysis was accomplished of the medical system comprised of the personnel, health information technology systems, and policies that are the functional instantiation of an Air Force Flight and Operational Medicine Clinic (FOMC). The purpose of the FEA was to understand the clinic staff (i.e., the users), their needs in accomplishing the clinic's mission, and the demands of the work situation. The primary methods of the FEA included workflow analysis, process mapping, and process redesign. Each FOMC-unique workflow was observed and analyzed to identify points of waste (i.e., inefficiency or decreased effectiveness). Types of waste were categorized based on lean production principles. Using the DoD Human Factors Analysis and Classification System (HFACS), observed waste in the workflows was considered an active failure and the related latent failures at the preconditions, supervisory, and organizational levels were subsequently identified. These latent failures were then addressed for remediation in terms of the DoD DOTMLPF-P framework. Accordingly, the overall workflow analysis flowed from observed waste to underlying latent system failures to DOTMLPF-P findings and recommendations.

15. SUBJECT TERMS
Human Systems Integration, Flight and Operational Medicine Clinic, Workflow Analysis, Front End Analysis, Process Improvement, Air Force Medical Service, AFMS, HSI, Manpower, Personnel, Training, Human Factors, Survivability, Habitability, Environment, Safety, Occupational Health, Human Factors Analysis and Classification System, HFACS, DOTMLPF-P

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1   Introduction

The Department of Defense (DoD) Military Health System is engaged in efforts to acquire a replacement to its legacy Electronic Health Record (EHR) system known as the Armed Forces Health Longitudinal Technology Application (AHLTA). EHR selection and implementation is a complex and disruptive process, and any organization embarking on the process is well advised that documenting and analyzing workflows must be their first task. Workflow simply refers to the interaction of processes (made up of tasks) through which a clinic or hospital provides services to patients. The challenge of EHR implementation is largely about tailoring the system to user preferences and workflows. For the Air Force (AF) Flight and Operational Medicine Clinic (FOMC), it is critically important that its workflows be addressed given the potential for unique attributes not routinely shared across other health systems. The workflows and analysis support contributions to the survivability of the war fighter by demonstrating that service members will benefit from the improved care coordination that will be provided by a replacement EHR and standardize processes.

There are many ways to approach conducting a workflow analysis. In this study, a Front End Analysis (FEA) was carried out on the medical system comprised of the personnel, health Information Technology (IT), and policies that are the functional instantiation of a FOMC. The purpose of the FEA was to understand the clinic staff (i.e., the users), their needs in accomplishing the clinic's mission, and the context-specific demands of the work situation. This information is an essential prerequisite for ensuring that a future EHR accommodates FOMC staff, versus the current state of affairs where the staff accommodates their EHR.

The primary methodologies of the FEA included process mapping, workflow analysis, and process redesign. Process mapping, or flow charting, involves diagramming all of the tasks required to carry out a process, and identifying the points at which one process intersects with another. Workflow analysis, or process analysis, reveals where task sequence is crucial, identifies bottlenecks or performance barriers, identifies opportunities (often the same as bottlenecks), creates solutions to relieve bottlenecks, re-analyzes new processes, makes efficiency improvements, and takes advantage of functionality provided by a new or updated EHR. Process redesign then uses the information gathered from the analysis and rearranges, eliminates, or restructures tasks to make the process more efficient— that is, protocol- or rule-based, less time-consuming, fewer hand-offs, and clearer accountability. Process redesign also takes into account the introduction of strategic factors such as personnel restructuring and new technology.

Clarifying and improving workflows makes EHR adoption go more smoothly. In turn, EHR implementation further improves workflows. This "exchange" between EHR and workflow also facilitates productive conversations about the overall Human Systems Integration of the staff within the FOMC health delivery system. Often process redesign results in more efficient workflows, enabling the staff to better weather the disruption that EHR implementation can bring. Aside from enabling EHR implementation, the process maps created during the workflow analysis are also useful for auditing and refining training programs, institutionalizing best practices and organizational standards, and embedding clinical protocols in processes. Thus, documenting and analyzing FOMC workflows will provide better value through improved efficiency, create greater staff satisfaction, and provide a roadmap for achieving transformation in the provision of aeromedical services through forthcoming EHR and other health IT investments. Additionally, clinical improvements driven by EHR will ultimately improve the health of the warfighter by reducing the susceptibility and vulnerability to illness, improving injury prevention, and improving return-to-duty after injury. The improved EHR and workflow allows for better case

management and reduced instances where the warfighter would   return to duty status or even deploy prematurely.

Methodology

1.1   Phase I: Document Review and SME Technical Meetings

The team analyzed 26 policy documents to understand formal AF organizational expectations for the FOMC. These documents included Air Force Instructions (AFI) for the following functional areas: Aerospace Medicine, Flying Operations, Medical, Health Services, Personnel, and Security. In aggregate, these documents prescribed the methodology for conducting the FOMC mission. Subsequently, baseline workflows were created and benchmarked to the policy and guidance. In a series of technical meetings, these baseline workflows were vetted with FOMC Subject Matter Experts (SMEs.)

1.2   Phase II: FOMC Site Visit Interviews and Observations

The team conducted site visits at six Air Force installations to gather information regarding the actual workflows by which the FOMC provides aeromedically focused healthcare services. The team used the following principles of ethnography during data-gathering:

- *Holism -* Focus on relations among activities and not on any single task or particular individual; understand that everything is connected to everything else (i.e., all parts of the FOMC are interrelated and individual parts cannot be studied in isolation).
- *Descriptive/Native's Point of View* - Description emanates from the point of view of those people involved in the system.
- *Study People in their Native Environment* - Observations occur in the natural setting of the people working in the system – in this case, the FOMC.

These principles were emphasized with FOMC staff during the site visits. Each site visit was 3-4 days in duration, during which open-ended interviews and unobtrusive observations of FOMC staff were accomplished. The team detailed the (1) workflows, (2) tasks/steps involved in each workflow, (3) variations to these workflows, (4) roles/staff responsible for completing tasks, (5) bottlenecks and/or performance barriers, and (6) clinic staffs' ideas for addressing the variations in the workflows and improving/eliminating performance barriers. Also, the team distributed a usability questionnaire to elicit standardized user feedback regarding the system attributes and user satisfaction with the primary health IT systems embedded in FOMC workflows. Roles observed included Physician, Nurse, Physician Assistant (PA), Medical Technician, Medical Administrative Technician, Medical Standards Management Element (MSME) personnel, and Independent Duty Medical Technician (IDMT).

1.3   Phase III: Analysis

Observed workflows were evaluated using traditional process improvement techniques. The analysis focused on waste identification and minimization or elimination of waste within the workflows, producing value added processes with improved speed, accuracy, and patient and staff satisfaction (aligning with the Air Force Medical Service [AFMS] strategy concept of Better Value and Better Care). Table 1 describes the eight types of waste considered in the analysis. These were taken from James Womack's work on lean production and lean thinking, which is based on Toyota's business system.

Table 1: Process Improvement - Eight Wastes (Source: James Womack - Lean Thinking)

Eight Wastes	Descriptions
Transportation or handling	The required relocation/delivery of patient materials or supplies to complete a task.
Motion	The movement of people that does not add value.
Waiting	Idle time created when people, information, equipment, or materials are not at hand.
Defects or Quality Errors	Work that contains errors or lacks something of value.
Inventory	More materials on hand than are required to do the work.
Over-production or Re-work	The redundant work or creation of items not demanded by actual patients.
Over-processing	The activities that do not add value from the patient's perspective.
Non-Utilized Staff / Confusion	People not able to perform up to their capabilities and that are wasting their talent. Confusion can also play a part in individuals not being able to perform their duties.

The study team then conducted a root cause analysis to identify the higher-level systems factors contributing to the observed waste. For the root cause analysis, the team leveraged the Department of Defense Human Factors Analysis and Classification System (DoD HFACS), which is based on Reason's (1990) and Wiegmann and Shappell's (2003) concept of *active failures* and *latent failures* (see Appendix G for an overview of DoD HFACS). The model defines four levels of failures:

> **Active Failures:** The actions or inactions of individuals that are believed to cause the error/waste.
>
> **Latent Failures/Conditions:** The errors that exist within the organization or elsewhere in the supervisory chain of command that affect the sequence of events characteristic of the error/waste.

1) *Acts*: The active failure or action committed by an individual (i.e., ineffective action or workflow waste in the context of this study).
2) *Preconditions:* The factors, such as conditions of individuals, workplace environmental (technological and physical) factors, and/or workplace personnel factors, which contribute to workflow waste.
3) *Supervision:* The factors contributing to workflow waste that were traced back to the local organization and its leadership.
4) *Organizational Influences*: The factors contributing to workflow waste that were traced back to the corporate or enterprise level.

Figure 1 depicts the "Swiss Cheese" illustration of the HFACS model, showing the levels at which active and latent failures may occur within clinic workflows and how active failures (i.e., waste) result from higher-level system failures at the levels of preconditions, supervision, and organizational influences. Since latent failures at the level of preconditions, supervision, and organizational influences are generally persistent over time, they were expected to manifest in various forms of waste and impact multiple workflows, which was indeed the observed case.
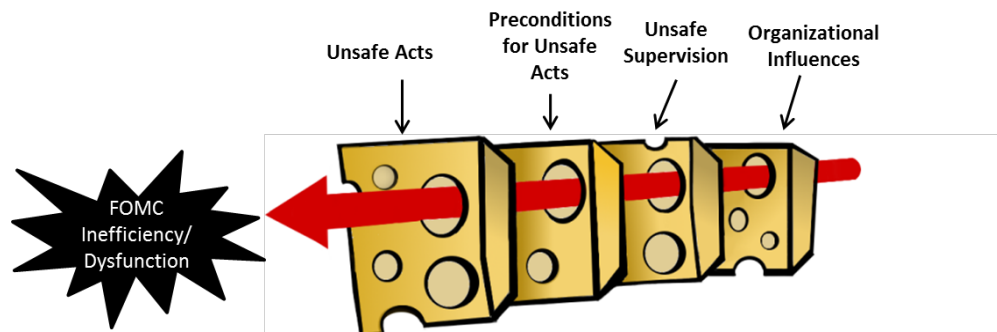
Figure 1: The "Swiss Cheese" Model (adapted from Reason, 1990)

As a basis for recommendations, the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) framework provided the solution space for both materiel and non-materiel approaches to closing capability gaps discovered during the analysis. DOTMLPF-P is a proven process used in the Joint Capabilities Integration and Development System (JCIDS) for acquisition during a Functional Solutions Analysis. Specifically, latent failures identified from the HFACS analysis were traced to the DOTMLPF-P framework for discussion. Figure 2 illustrates the linkage of the three analytic models used in this study: lean production to identify waste, HFACS to determine root causes of observed waste, and the DOTMLPF-P framework for aggregating and organizing findings and recommendations across workflows. Based on the waste evaluation and recommendations, the study team re-engineered the FOMC workflows to reduce waste and increase clinic efficiency.
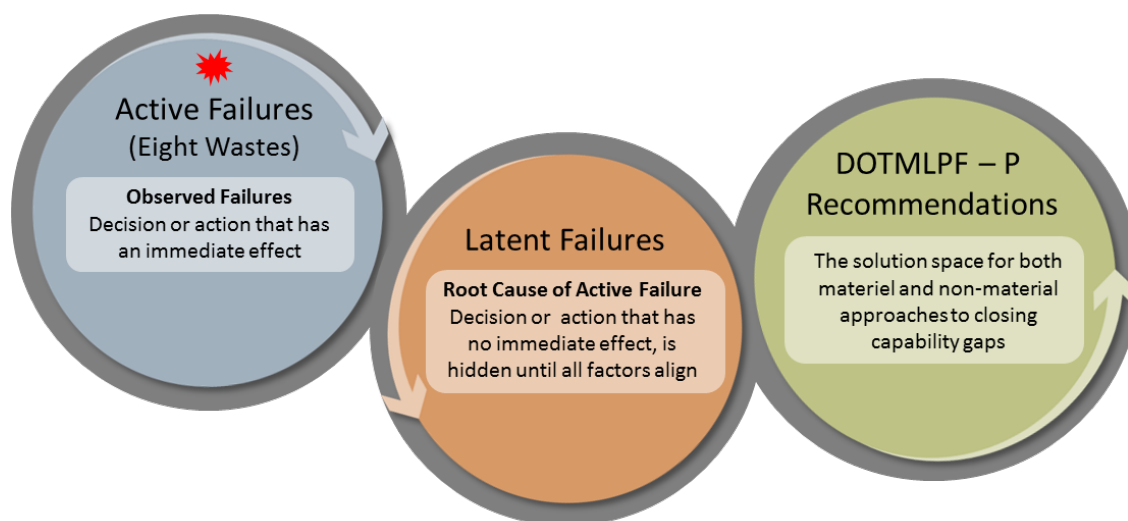
Figure 2: Analytical Model Linkage

2   Baseline and Observed ("As-is") Workflow Analysis

The FOMC is best envisioned as a health delivery system comprised of multiple workflows. Figure 3 represents the majority of the workflows (depicted as white circles) as determined through document review and observations; the circles were sized to account for the relative proportion of time staff spent performing the workflows.[†] The clinic provides the environment (in terms of facilities, personnel, health IT, policies, etc.) in which these workflows are embedded and resourced. For example, many workflows are executed using shared exam rooms, equipment, and clinical staff. This insight is critical as workflows are competing for resources and interact making managing a clinic an inherently complex task.
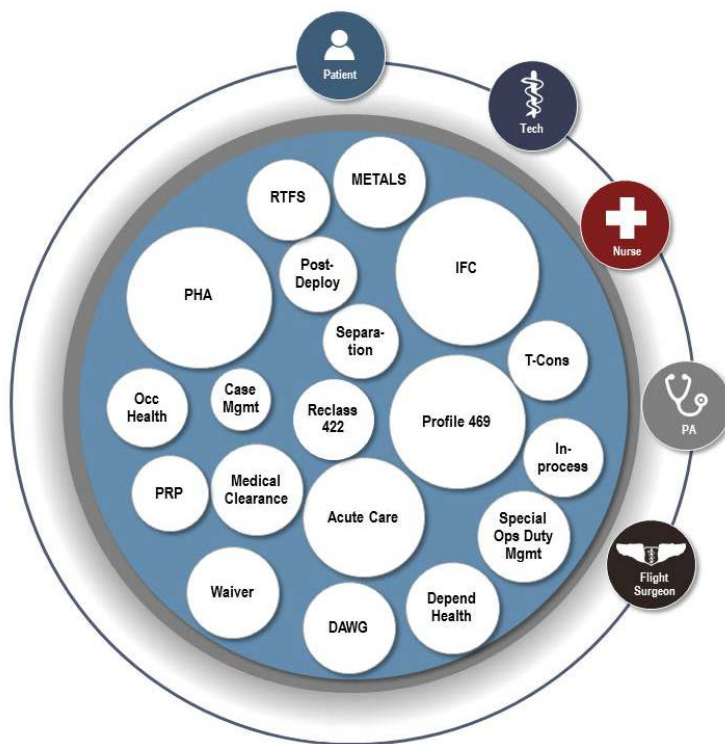
Figure 3: Clinic Workflows and Primary Roles

Based on the Phase I document review and SME technical meetings, seven workflows were identified for detailed analysis (Table 2).[‡] These workflows represent labor intensive processes critical to the FOMC mission—that is, they are the primary value producing workflows. Although acute patient care drives a large portion of clinic workload, the occupational health responsibilities were the primary focus of the analysis as they distinguish the FOMC from the traditional primary care clinic. Recommendations and lessons learned from ongoing Air Force Patient Centered Medical Home (PCMH) initiative should be leveraged to improve FOMC acute patient care workflows.

Table 2: FOMC Workflows

FOMC Baseline Workflows
Initial Flying Class (IFC)
Fly Preventive Health Assessment (Fly - PHA)
Aeromedical Waiver
Profile 469 Duty Limiting Restrictions
Occupational Health Medical Surveillance Exam
Personnel Reliability Program (PRP) Certification / Administrative Qualification
PRP PHA

[†] Proportional time spent was approximated based on observations across several clinics; individual clinics may experience variations.

[‡] The full image of each baseline workflow is presented in the Technical Document entitled "FOMC Task Process Mapping".

2.1   FOMC Active and Latent Failures

Based on the Phase II FOMC site visit interviews and observations, seven observed or "as-is" workflows, corresponding to the FOMC baseline workflows, were mapped and analyzed.[†] Application of lean production principles led to the identification of four prevalent categories of waste—*Over-processing, Over-Production and/or Rework, Waiting, and Non-Utilized Staff/Confusion*—that were considered active failures for the subsequent HFACS root cause analysis. Other lean principles the study team considered included:

- Smoothing the flow of the clinic staff and patients
- Minimizing handoffs between staff and other departments to prevent patients from getting lost in the shuffle or staff being confused about what is taking place with a particular patient
- Minimizing confusion within the clinics, as evidenced by the lack of staff training in some areas, unclear staff assignments and poor staff communication.

Figure 4 pictorially summarizes the active and related latent failures identified from the analysis. The active failures are described further in section 3.1.1 and the latent failures are described and mapped to the active failures in section 3.1.2.
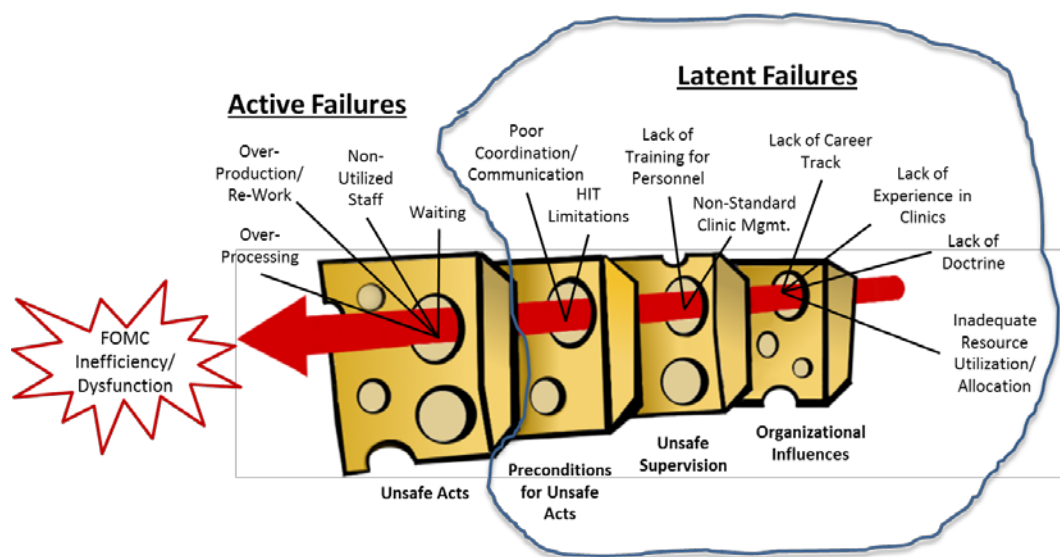
Figure 4: FOMC Active and Latent Failures

2.1.1   Active Failures (Waste)

Although waste in the FOMC workflows was primarily in the categories of over-processing or rework, over-production, waiting, and non-utilized staff/confusion, all eight categories of waste were observed during the FOMC site visits. Representative examples from all eight categories of waste are provided in Table 3. While these examples were not universal to all FOMCs, failures from all eight categories were present at each FOMC.

[†] The full image of each baseline workflow is presented in the Technical Document entitled "FOMC Task Process Mapping".

Table 3: Examples of Wastes

Wastes	Defect Observations
Transportation or Handling	Unnecessary patient handling: Exam workflows utilized non-contiguous spaces, resulting in the patient relocating multiple times to different rooms to complete an exam.
	Unnecessary patient transportation: Components of exam workflows (e.g., ancillary services) were not located in the FOMC, requiring the patient to drive to another building to complete the exam. Components of exam workflows were scheduled on different days requiring the patient to return to the FOMC several times to complete the exam.
Motion	Staff Movement: Staff left exam rooms to search for information (e.g., medical standards, WebHA results, etc.), supplies, and/or paperwork (e.g., sister Service forms) needed to complete steps in the exam.
	Staff Movement: Staff moved back and forth between exam rooms and their workstations or offices to access health IT.
Waiting	Staff Waiting: Staff often waited to accomplish documentation because of unavailability of health IT (attributed to low system reliability); frequently occurring health IT system bugs, which necessitate application restart, caused staff to wait for the application to reload; latency in EHR required staff to wait for functions to execute and screens to refresh.
	Patient Waiting: Walk-in sick calls result in service members waiting in a queue until a provider is available.
Defects or Quality Errors	Quality Errors: Exam packages submitted to Major Air Command (MAJCOM) frequently contained errors that resulted in the package being returned for rework, delaying the aeromedical disposition.
	Quality Errors: Misapplication of Air Force medical standards to sister Service members resulted in these members being later judged, not aeromedically qualified.
Inventory	Inventory: Continued use of paper medical records for some processes (PRP) drives the need for records storage space and additional manpower for records maintenance.
	Inventory: Medications and supplies are stockpiled and/or stored in the clinic, necessitating inventory management by technicians.
Over-Production and Re-Work	Over-production: AF Forms are used when sister Service members are seen in the FOMC, which are then transcribed into an Army or Navy form.
	Re-work: Health IT systems are not interoperable, necessitating that the staff replicates coding and documentation in several places during a single clinical encounter (e.g., annotating a diagnosis and duty limitation in both AHLTA and Aeromedical Services Information Management Systems (ASIMS).
Over-Processing	Over-processing: At many FOMCs, an individual is usually dedicated just to the development of Deployment Availability Working Group (DAWG) slides, which is a labor intensive task because of limited reporting capabilities within the current health IT systems.
	Over-processing: Electronic forms are printed to paper for signature and then scanned back into electronic format for storage in the EHR.
Non-Utilized Staff/Confusion	Confusion: Variation in workflow execution across providers and locations led to support staff role confusion, particularly for new technicians.
	Non-Utilized Staff: Nurses often lacked clear job descriptions and were not utilized in a nursing capacity; they were primarily used to "put out fires" rather than for population health, case management, and/or referral tracking.

2.1.2   Latent Failures

The analysis identified eight major latent failures that mapped to the four prevalent wastes (active failures) in the FOMC.

Health IT System Limitations

The technological environment is a factor when the design of the health IT systems affects the actions of users and results in waste. The FOMC technological environment is predominately defined by an EHR (i.e., AHLTA) and other aerospace and medical readiness-related health IT systems (i.e., ASIMS, Physical Exam Processing Program (PEPP), Aeromedical Information and Waiver Tracking System (AIMWTS), and Aeromedical Electronic Resource Office (AERO). Individual FOMC workflows often require the use of two or more non-interoperable health IT systems. The absence of a single user interface/presentation layer necessitated that clinic staff:

- Separately log into and interface with multiple systems to accomplish what should be a relatively simple task,
- Repetitively input the same data into multiple systems, and
- Detect and deconflict discrepancies across systems.

These health IT system limitations substantially lengthened task completion time, both in terms of data acquisition and data entry, and increased the likelihood for errors. Additionally, clinic staffs often transferred data from a digital format to a paper format for processing and signature and then transferred it back to a digital format for storage and transmission—an exemplar illustration of over-processing. Clinic staff also developed local workarounds, in the form of Excel databases, to provide a tracking management capability that was absent within or across health IT systems. Lastly, low reliability and availability of health IT systems was cited as a significant driver of staff waiting.

Inadequate Personnel Training

Local and organizational training is a factor when one-time or initial training programs, upgrade programs, or transition programs are inadequate or unavailable and result in waste. Specific training on health IT systems and their use in the specific FOMC workflows was inadequate, both in terms of the initial, Air Force Specialty Code (AFSC)-awarding training programs and the local, medical treatment facility training programs. The vast majority of health IT training is obtained informally on the job. Thus, awareness of health IT functionality was low and clinic staffs were not using the full capability of the systems while perceiving the need for many system workarounds.

There were FOMC-specific initial training programs for only a subset of the AFSCs staffing the clinic (e.g., physicians and physician assistants). Other AFSCs (e.g., nurses) did not receive FOMC-specific initial training before rotating into the clinic. On the whole, initial training programs did not address the content and execution of workflows in significant detail, nor were there explicit workflow-related standards of performance across curricula. All the workflows required team coordination, but none of the initial training programs provided team coordination training, as implemented for teams in the PCMH, nor did they provide training or practice in executing workflows as a multi-disciplinary team. The first time FOMC staff could expect to fully execute a workflow as a team was after beginning work in the clinic.

Poor Team Coordination and Communication

Coordination and communication is a factor when interactions among individuals and teams involved in the execution of a workflow result in waste. As previously described under training, all FOMC workflows are executed using teams. However, relatively little attention has been given to team performance in the FOMC as compared to other medical treatment facility care teams working in primary care or

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specialty clinics, like pediatrics. Given the absence of standardized workflows with corresponding team roles defined and practiced during an initial training program and consistently utilized in the field, it became incumbent on the local clinical leadership to harmonize their personnel and the vagrancies of their local processes and procedures—which could vary day to day based on the provider—into an effective and high performing team. The latter situation significantly raised the burden of team leadership, which was not uniformly exercised across clinics or providers within clinics. Daily workflow preparatory tasks and prebriefing were not routinely practiced across clinics. Personnel tended to stay in their lane when performing tasks and there was little cross-monitoring of performance to detect errors and make on the spot corrections. Task delegation was not actively managed, such that the distribution of tasks at times resulted in some staff members being overloaded while others were underutilized. This trend was exacerbated by a lack of knowledge about individual team members' capabilities. The general inexperience of the medical technician workforce also contributed to a steep authority and knowledge gradient between technicians and providers that could manifest as a lack of assertiveness. The constellation of these factors contributed to personnel misutilization and failure to detect and correct errors.

Inadequate clinic resources, specifically in terms of facility layout, were a contributing factor in degrading team coordination and communication. In some clinics, team member workstations were located in non-contiguous areas of the clinic, resulting in physical separation of team members and degraded communications. In clinics where team members were collocated, perceived performance and morale were higher.

Limited FOMC Experience
Limited FOMC experience is a factor when an individual's or team's familiarity with a task or workflow is low and this unfamiliarity causes waste. For the vast majority of clinic staff, assignment to an FOMC is a singular event and not a recurring epoch in a career. This revolving door for clinical staff has resulted in an overall low aggregate experience level. The impact on clinical workflows manifested as wide variations in task performance, lack of knowledge about the standard for task performance, variances in workflows, and shallow knowledge of policy and procedures. Additionally, there was no systematic effort to mitigate this problem by ensuring team compositions that balanced experienced and inexperienced personnel.

Lack of Career Tracks
Lack of a career track is a factor when the process through which manning and staffing the clinic are inadequate and the inadequacy causes waste. Unlike nearly every other clinic in the medical treatment facility, there is no particular medical specialty for providers or dedicated career fields for support staff on which to draw to consistently meet FOMC manning and staffing needs. This personnel strategy has resulted in a mosaic of providers and support staff. Consequently, there was no dominant practice pattern in clinics, nor did teams have members with predictable skill sets. This situation, in turn, fostered confusion and misutilization of staff because of uncertainties about individual staff members' training, scope of practice, and/or competency level.   It is noteworthy that the AFMS has developed and is in the process of launching the 4N0X1F Flight and Operational Medicine Technician (FOMT) career field. Establishment of the FOMT career field is a significant step forward in mitigating this latent failure, but it does not address the corollary problems for FOMC providers and nurses.

Lack of Doctrine
Doctrine is a factor when the doctrine, philosophy, or concept of operations in an organization is flawed, and this flaw leads to waste. The Aerospace Medicine Enterprise (AME) lacked doctrine for the overall operation of the FOMC as a system. Specifically, as an organization closely aligned with the field of

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aviation, the AME had not acculturated aspects of aviation that are attributes of high-reliability, high-quality organizations.   For example, there was no standardization of core processes across the AME, nor was there a systematic method for achieving such standardization. Absent such a mechanism, there was no method for systematizing best practices and benchmarked programs. While there were policies that provided guidance for individual workflows, they were insufficient to achieve standardization at the level of workflow-specific procedures, checklists, templates, etc., that are the usual bedrock for training and operations. Nor was there standardization at the level of the teams, whether in terms of workflow-specific team member roles or the use of team coordination and communication techniques across workflows.   These failures were a primary driver of staff misutilization and role confusion.

There was also a culture of error tolerance in the FOMCs that manifested in the workflows as additional tasks that were implemented to screen for the flawed execution of prior tasks. Additionally, errors were monitored and tracked for trend, but root cause analyses were not used to identify points for mitigation. Thus, re-work was systematically normalized into FOMC workflows.

Inadequate Clinic Supervision/Oversight
Inadequate clinic supervision/oversight is a factor when the availability, competency, quality or timeliness of supervision or oversight does not meet workflow demands and creates waste. Each of the FOMC workflows was driven by a distinct policy document that was independently developed, resulting in a significant oversight challenge for clinic leadership when the workflows were considered in the aggregate. This situation was exacerbated by the fact that these workflows generally competed for the same clinic resources, to include personnel, equipment, and exam rooms. When these various workflows were integrated into a daily schedule, which often included acute patient care workflows, the transitions resulted in inefficiencies as resource conflicts caused queues to form and staff pivoted between modes of operation and corresponding mental models. When clinic supervisors tried to emphasize certain workflows (e.g., clearing a PHA backlog), they tended to fail to actively manage workload distribution to prevent the overloading or underloading of particular staff members.

Most FOMCs also did not employ the skills of a Group Practice Manager to track access, patient wait times, manpower/personnel issues, etc., to optimize resource utilization. Clinics that underutilized or inappropriately utilized staff likely could have provided more access with their current resource allocations. Additionally, the frequent use of sick call/walk-ins antagonized the supervision/oversight challenge by voluntarily yielding control of the scheduling of demand.

AME program management, procedural guidance (policy), limited FOMC experience, and inadequate training were contributing factors. In terms of training, clinic supervisors need training in planning and managing complex and interacting workflows. Such knowledge is not likely to be imparted by medical education programs, nor is it easily assimilated through practical experience.

Inadequate Clinic Resources
Inadequate clinic resources are a factor when clinic resources or the management of their utilization is inadequate, and this situation leads to waste. Many clinics had insufficient numbers of exam rooms to allow teams to maximize patient throughput. In some cases, providers had a single exam room, which significantly constrained the ability of teams to perform workflow tasks concurrently on several patients and resulted in patient queues. The lack of common work areas also resulted in teams being physically separated, increasing the challenge of coordination and communication as well as adding to staff movements.

Table 4: FOMC Active and Latent Failures

	Latent Failures	Active Failures	Description	Example
1.	Heath IT System Limitations	Over-production and / or Re-Work, Waiting	Health IT systems not interoperable and no single data repository	The lack of interoperability between AHLTA, PEPP, and AIMWTS required the same information be manually reentered multiple times (re-work) to complete an IFC exam.
2.	Inadequate Personnel Training	Over-production and / or Re-Work, Over-processing	Limited IT system training Limited FOMC training	Clinic staff had limited training on exam workflows, medical standards, and associated health IT systems, resulting in exam packages being submitted with errors; these exam packages were returned to the clinic for correction (re-work).
3.	Poor Coordination & Communication	Waiting, Non-Utilized Staff / Confusion	Communications barriers between FOMC staff Coordination in completing tasks	FOMC teaming and coordination varied, depending on the day of the week or who was running the clinic, which resulted in medical technicians being confused about which provider they were assigned to and the tasks they should accomplish for that provider.
4.	Limited FOMC Experience	Non-Utilized Staff/ Confusion, Waiting	Limited number of FOMC experienced staff members	Lack of experience in flight medicine and primary care workflows led to a novice flight surgeon not understanding (confusion) the requirements to complete a profile.
5.	Lack of Career Tracks	Non-Utilized Staff /Confusion, Waiting	Staff not familiar with FOMC workflows	Medical technicians rotating into the FOMC did not have an understanding of the processes and forms, which caused them to rely on more experienced staff to accomplish tasks and were unable to proceed without direction (resulting in waiting).
6.	Lack of Doctrine	Non-Utilized Staff / Confusion, Waiting	Issues with classroom training and sharing of best practices for FOMC	The absence of a systemic means for codifying best practices contributed to the failure to share an Inspector General commended program utilizing FOMC nurses to manage dependent population health (nurse underutilization).
7.	Inadequate Clinic Supervision/Over sight	Non-Utilized Staff / Confusion, Waiting	Different clinics working toward different goals	Clinic management emphasized different organizational goals, such as eliminating PHA backlogs versus minimizing Duties Not Involving Flying (DNIF) rates, resulting in some medical technicians being over-utilized completing PHAs while others assigned to different tasks had idle time (under-utilized staff).
8.	Inadequate Clinic Resources	Non-Utilized Staff / Confusion, Waiting	Daily variations in staffing assignment or scheduling	Assignment of medical technicians to only perform certain exams resulted in some technicians being over-utilized and others under-utilized based on the demand for exams (non-utilized staff)

2.2 Workflow Process Maps

This section summarizes the analysis of the seven primary FOMC workflows. For each workflow, the following analysis artifacts are provided:

- The process map for the baseline workflow
- The process map for the observed "as is" workflow with annotations at the task-level denoting the prevalence of task-specific waste (✳) and task-relevant health IT interactions (⊡) ; as there were variations across FOMCs in the execution of the workflow, the observed process map is an amalgamation of the site-specific workflows
- A pictorial representation of the Swiss cheese model annotated with the active and latent failures that were associated with the observed workflow
- A tabular summary of site-specific variations from the baseline workflow (when such variations were observed—that is, the absence of a table implies the baseline and observed workflows were identical).

2.2.1 Initial Flying Class (IFC)

The IFC examination is a pre-placement exam for civilians and service members being considered for assignment to aviation-related special duty positions. It consists of an exhaustive medical history review and comprehensive physical examination. The FOMC staff is responsible for verifying and documenting that examinees meet the appropriate physical standards, and in the case they do not, conducting the appropriate ancillary evaluation, culminating in a recommended aeromedical disposition.

Initial Flying Class (IFC) – Baseline

KEY

◆ Decision Point

Patient
- 1 Civilian Start: Receive Ltr
- 2 AD Start: Provide MPF Review
- 3 Army/Navy Start: Provide Ltr

MPF
- 4 Approve Rqmts for Physical

MSME
- 5 Schedule Record Review
- 6 Identify Rqmts
- 7 Review Record
- 8 Enter Demographics
- 9 Verify Users/Add in AHLTA
- 10 Schedule Exam
- 11 Order Tests
- 12 Confirm Results
- 13 Confirm Enzymes
- 14 Document Results
- 15 Order Testing
- 16 Conduct Hearing Test

Tech
- 17 Complete Para-professional Exam
- 18 Document Results

Immunizations
- 22 Provide Immunizations
- 23 Document

Optometry
- 19 Complete Testing
- 20 Accomplish Failures
- 21 Document Results

Flight Surgeon
- 24 Review Testing/Labs
- 25 Complete ARMA & Physical Exam
- 26 Document
- 27 Document Complete?
- 27N Complete Document
- 28 Sign PEPP
- 29 AIMWTS Required?
- 29Y Initiate Waiver

MSME
- 29N Review/Audit
- 30 Sign

Senior Flight Surgeon
- 31 Quality Review
- 32 Sign

Certification Authority
- 33 Review
- 34 Valid?
- 34Y Sign
- 34N END

MSME
- 35 Signatures Complete?
- 35Y END
- 35N Continue

Figure 5: Baseline IFC Workflow

Distribution A: Approved for public release, distribution unlimited. Release #88ABW-2014-1602, dated 11 April 2014
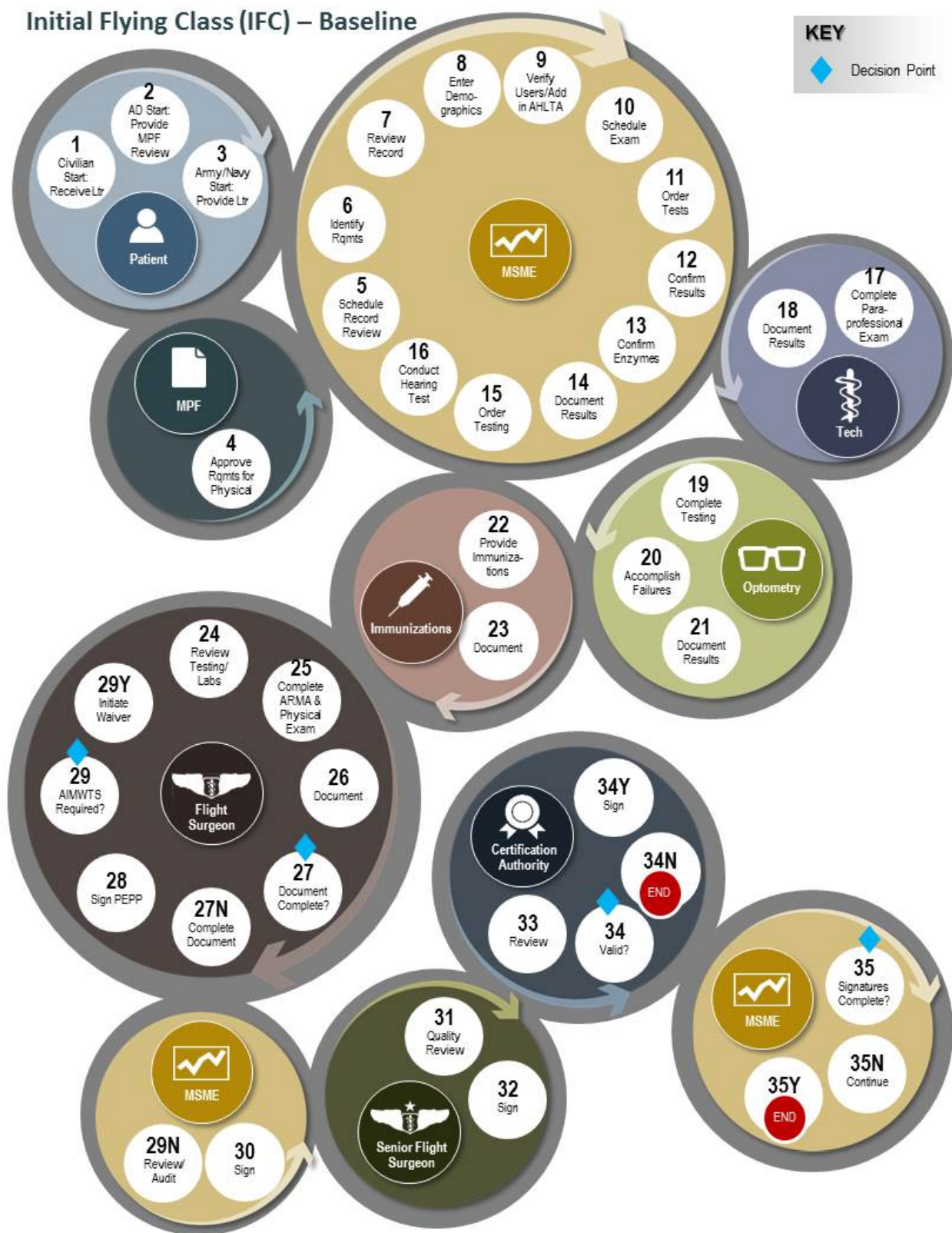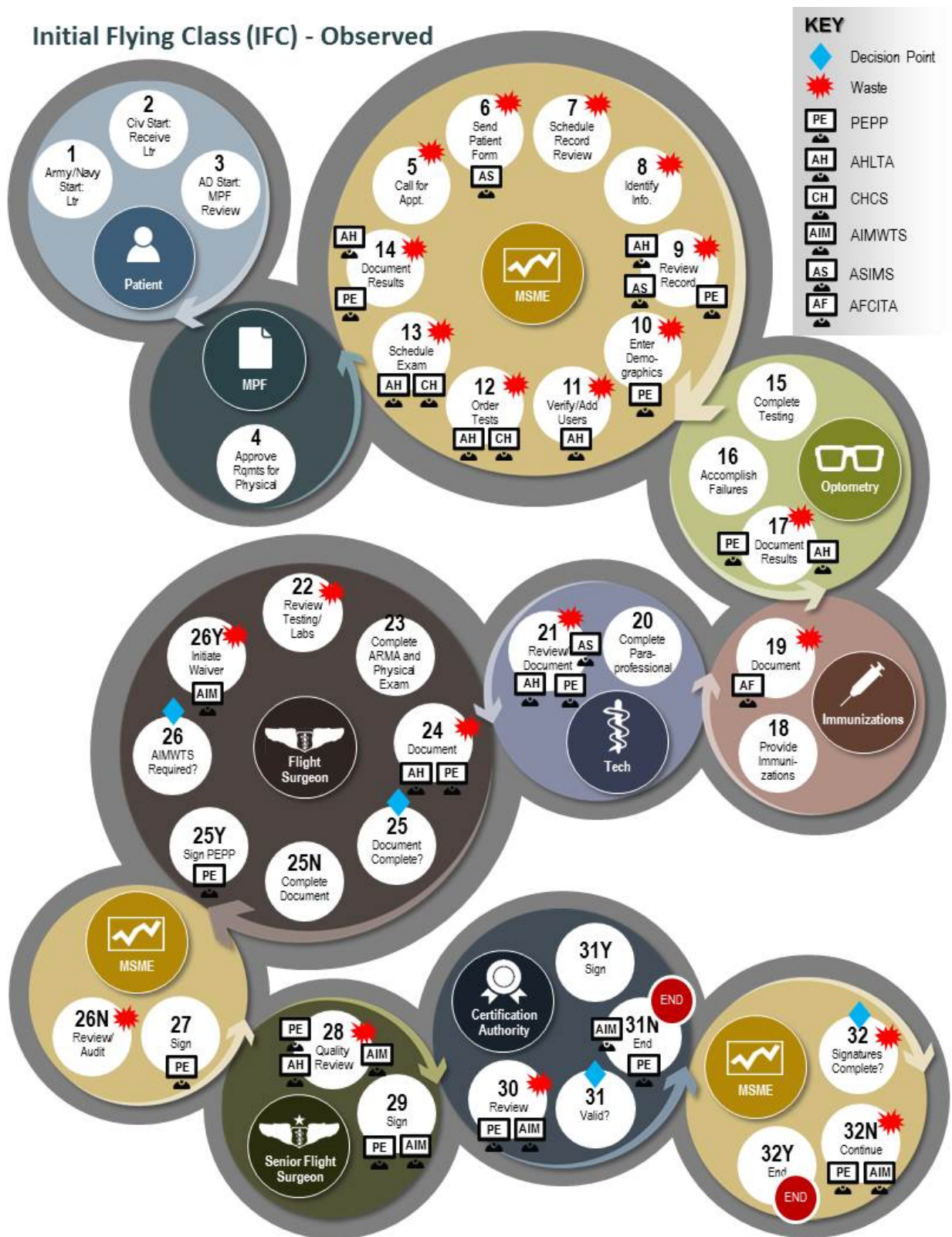
Figure 6: Observed IFC Workflow
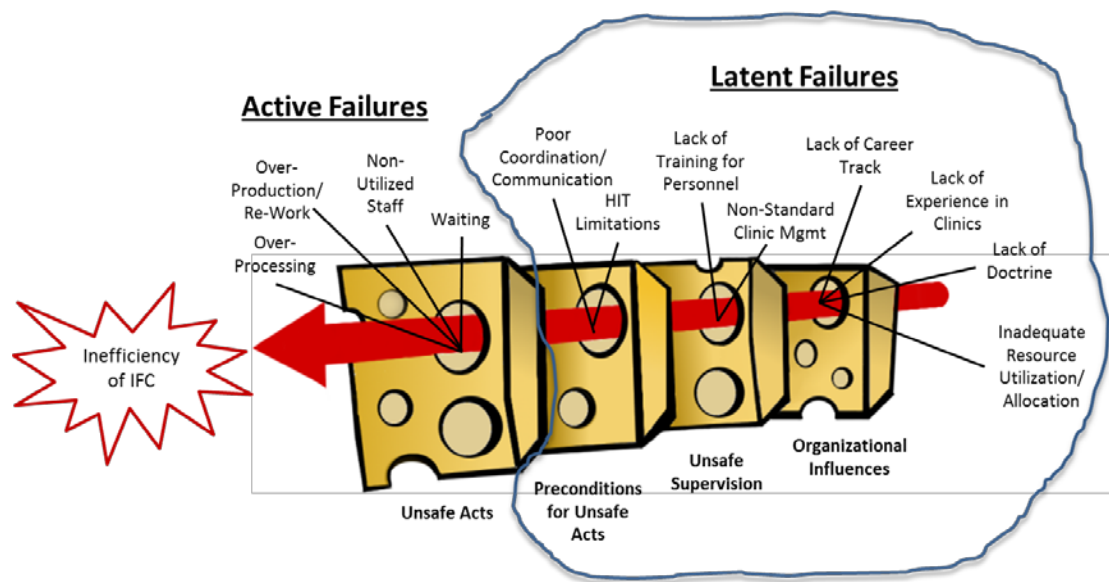
Figure 7: IFC Active and Latent Failures

Table 5: IFC Variations

Baseline Workflow Task	FOMC Identifier	Observed Variance
Schedule Record Review	Base 1	Examinee requests IFC at front desk
	Base 1	MSME sends form to examinee requesting medical history
	Base 2	MSME receive letter from Air Force Personnel Center
	Base 2	MSME logs letter from AFPC for tracking purposes
	Base 3	Examinee contacts MSME with letter from Air Force Personnel Center
	Base 4	Request paper medical records
Identify exam requirements, data entry and standards	Base 2	Sends examination requirements to examinee
Schedule exam with Flight Medicine	Base 2	MSME receives completed IFC checklist from examinee
	Base 2	MSME makes appointment in CHCS
	Base 2	MSME schedules appointment with Unit Point of Contact (POC)
	Base 3	MSME schedules all appointments required for the IFC (i.e., Flight Medicine, Optometry, and Dental)
	Base 4	MSME schedules all appointments required in the IFC (i.e., Flight Medicine, Optometry, and Dental,) and orders labs.

Baseline Workflow Task	FOMC Identifier	Observed Variance
Conduct hearing test	Base 2	MSME ensures hearing test is accomplished in Public Health prior to IFC in Flight Medicine
	Base 4	MSME ensures hearing test is accomplished in Public Health at end of IFC appointment
Document results in AHLTA and PEPP	Base 1	Medical technician waits until all results are documented in the AHLTA note
	Base 4	Two-technician team accomplishes IFC. One technician is responsible for conducting the "hands-on" paraprofessional exam, while the other technician subsequently inputs exam data into the health IT
Note:	Base 1	Examinee completes Optometry, Dental, and Immunizations on the day of the Flight Medicine appointment
	Base 2	Examinee completes Optometry and Immunizations prior to being seen in Flight Medicine
	Base 4	Examinee completes Optometry, Dental, and Immunizations on the day of the Flight Medicine appointment.

2.2.2 Fly Preventive Health Assessment (Fly PHA)

The PHA is a required periodic occupational health/medical surveillance examination performed on all service members to include:

- A current self-report of health status (accomplished using the WebHA tool)
- Review of medical records
- Identify and refer service member for treatment of current health problems as indicated
- Identify and recommend a plan to manage health risks
- Identify and manage occupational risk and exposure
- Identify and manage preventive needs
- Document PHA results in the EHR
- Review, update, and document Individual Medical Readiness (IMR) requirements
- Develop a health plan to improve health status.

For aviation-related special duty personnel, the fly-PHA includes an annual fitness for duty assessment to verify that they continue to meet occupationally proscribed physical standards.

Flying Preventive Health Assessment (Fly PHA) – Baseline

KEY
◆ Decision Point
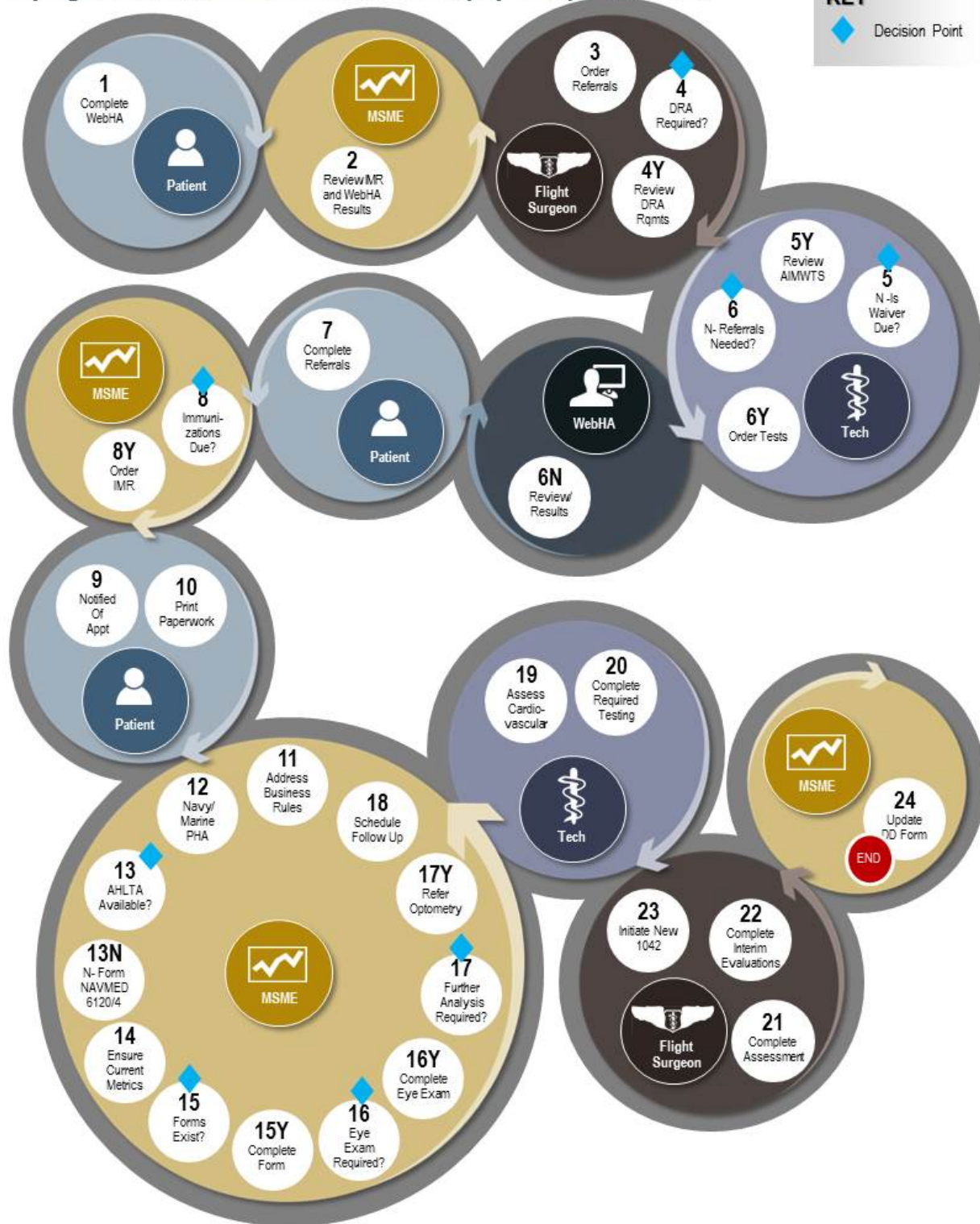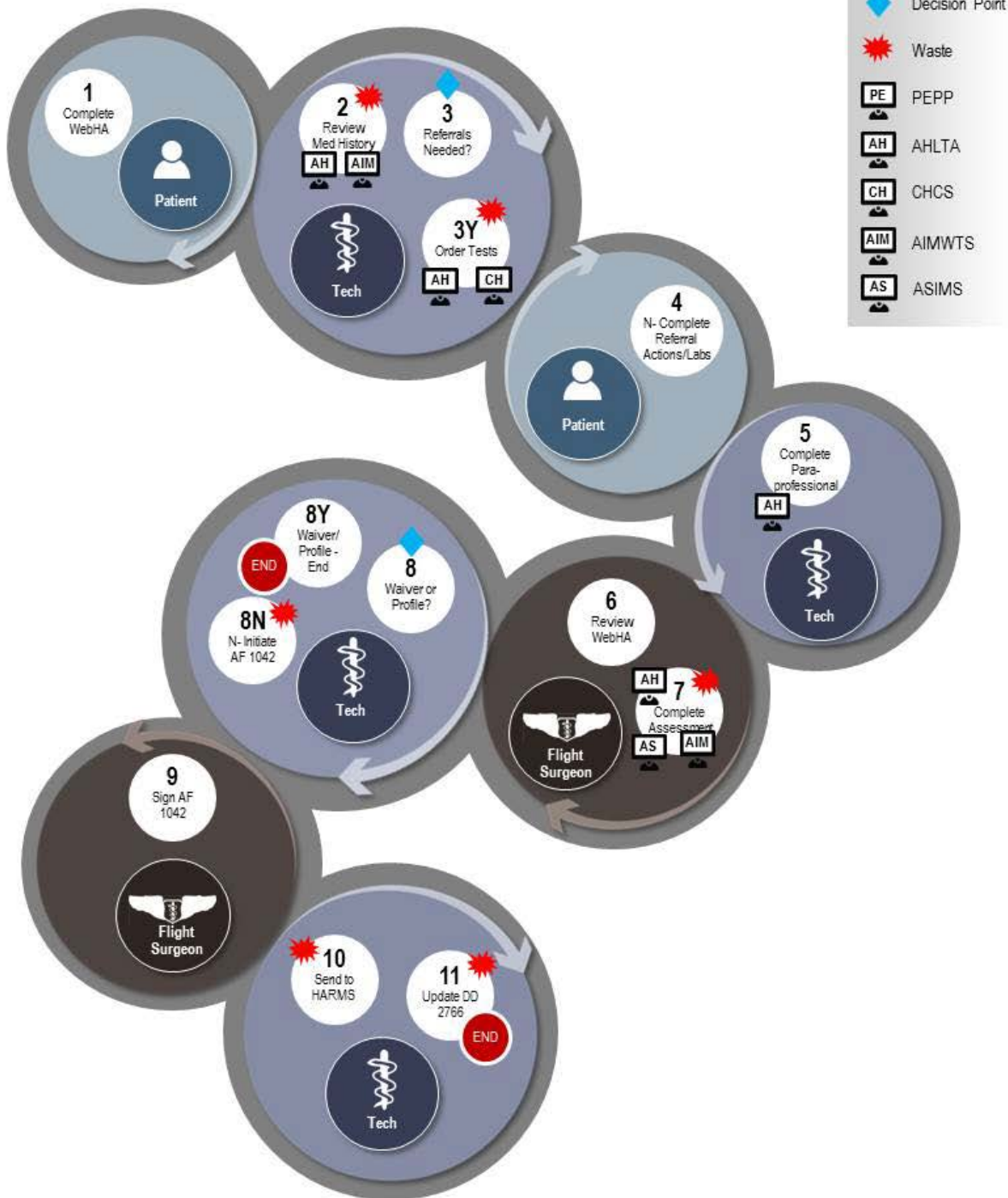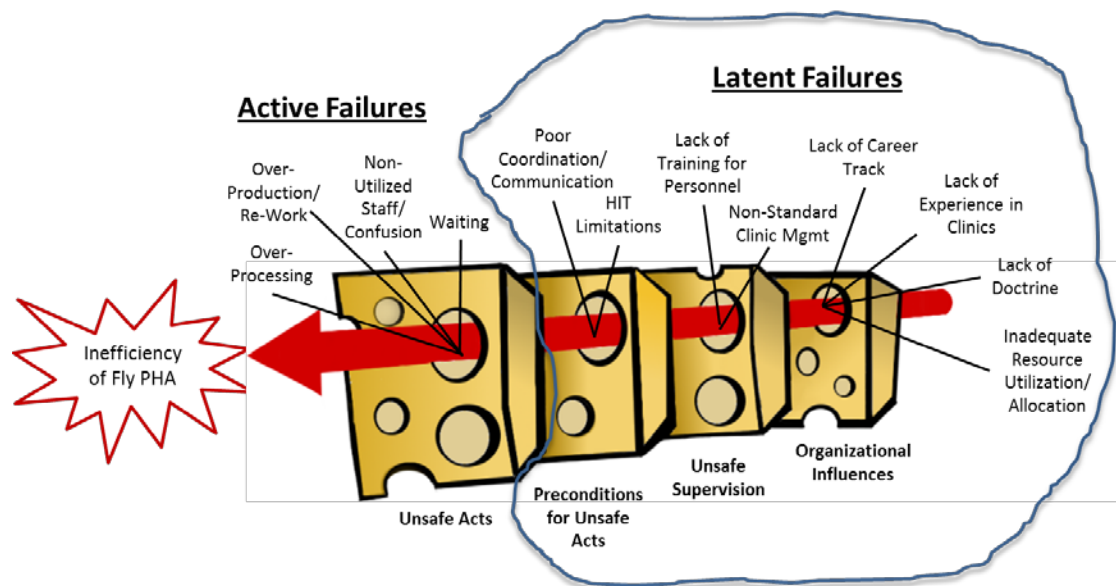
Figure 8: Baseline PHA

Figure 9: Observed PHA Workflow

Figure 10: Fly PHA Active and Latent Failures

Table 6: Fly PHA Variations

Baseline Workflow Task	FOMC Identifier	Observed Variance
Complete the WebHA tool within 30 days of scheduled appointment	Base 1	Technician notifies patient to complete WebHA onsite
	Base 2	Technician interactively completes WebHA with patient
Review WebHA results daily and initiate action on critical and priority actions each day	Base 1	Technicians rotate who is the WebHA monitor on a weekly basis
	Base 4	Technicians rotate who is the WebHA monitor on a case by case basis
Complete all annual 1042 required testing, AFI 48-123, waiver guide, and local PHA business rules	Base 2	A single Technician accomplishes all PHA requirements
	Base 4	Two-technician team accomplishes PHA. One technician is responsible for conducting the "hands-on" paraprofessional exam, while the other technician subsequently inputs exam data into the health IT
Note:	Base 1	Patients call the front desk to schedule their appointment
	Base 4	Patients call central booking to make their appointments

2.2.3 Aeromedical Waiver

The aeromedical waiver is an occupational medicine workflow that is triggered when a service member applying for or performing aviation-related special duties is determined to have a potentially permanent medical impairment. The workflow ultimately culminates in an accommodation decision by a designated aeromedical certification authority. The aeromedical workflow can be triggered from the IFC, fly-PHA, or acute patient care workflows. The workflow is labor intensive with manual record entry into multiple health IT systems, and it involves numerous (approximately six) patient/record handoffs.

Figure 11: Baseline Aeromedical Waiver

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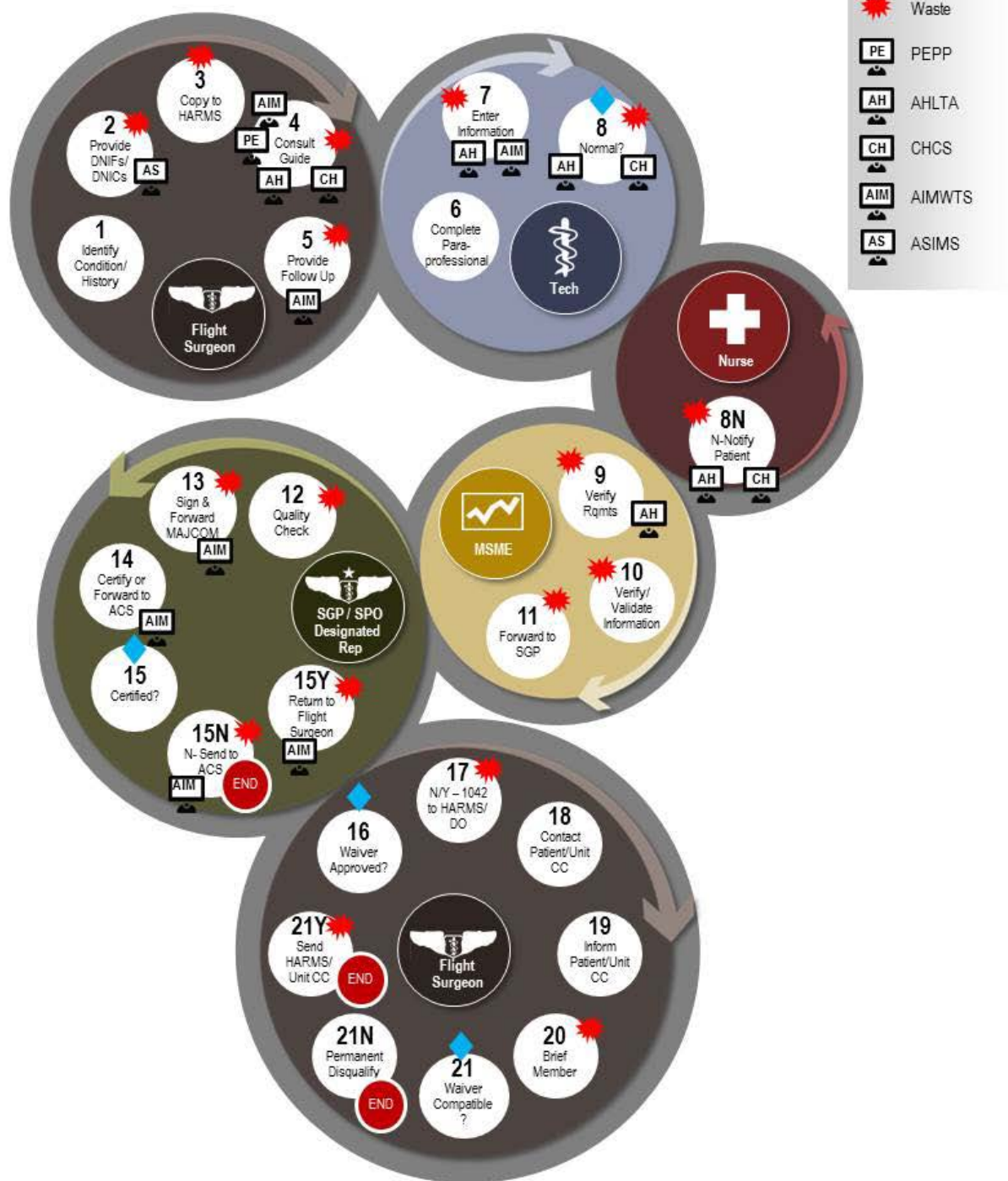
Figure 12: Observed Aeromedical Waiver Workflow
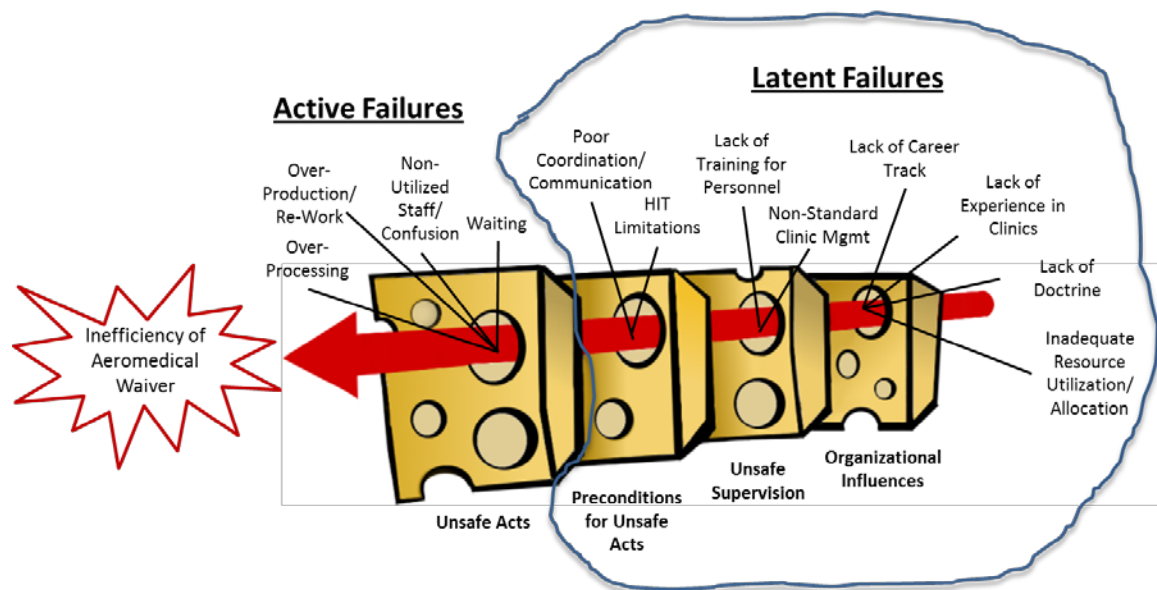
Figure 13: Aeromedical Waiver Active and Latent Failures

Table 7: Aeromedical Waiver Variations

Baseline Workflow Task	FOMC Identifier	Observed Variance
Verify all requirements meet AFI 48-123 and waiver guide	Base 1	MSME checks AIMWTS to verify requirements
	Base 2	MSME checks AIMWTS to verify requirements
Ensure all information is entered and validated by Flight Surgeon	Base 1	MSME ensures information is entered
	Base 2	MSME ensures information is entered
Forward it to Senior Flight Surgeon	Base 1	MSME forwards to the Flight Surgeon
Initiate 1042 RTFS and send to HARMS and DO	Base 2	MSME forwards signed 1042 to HARMS
Contact patient and Unit CC	Base 2	MSME emails member to let them know to pick up their copy of the waiver

2.2.4   Profile 469 Duty Limiting Restrictions

The Profile is an occupational medicine fitness for duty and disability management workflow. The workflow is triggered when a provider identifies that a service member has a presumed temporary impairment and that the impairment necessitates a duty, mobility, and/or fitness restriction. The workflow terminates when the impairment resolves or the member is reclassified as having a permanent impairment, the latter triggering a separate accommodation workflow involving the Integrated Disability Evaluation System (IDES). The Profile workflow is not limited to FOMC providers or empanelled aviation-related special duty personnel; however, the FOMC is responsible for managing the overall workflow.

23

Profile 469 - Baseline

KEY

◆ Decision Point

1 Present Medical Condition

Patient

2 Identify Restriction

3 Document Visit

4 Input Restriction

5 Input/Sign ASIMS/PIMR

PCM

6 Quality Review

7 Condition Duty/Fitness?

7Y Signs Paperwork — END

8 Condition 31,37,81?

9 81- Present 469

10 Complete Evaluation

11 Tailor 469

MSME

12 31,37- Validate 469 & Sign

13 Code 37?

13Y Send 469 Unit CC PEBLO — END

13N Send 469 Unit CC — END

SGP / SPO Designated Rep

Figure 14: Baseline Profile 469

Profile 469 - Observed
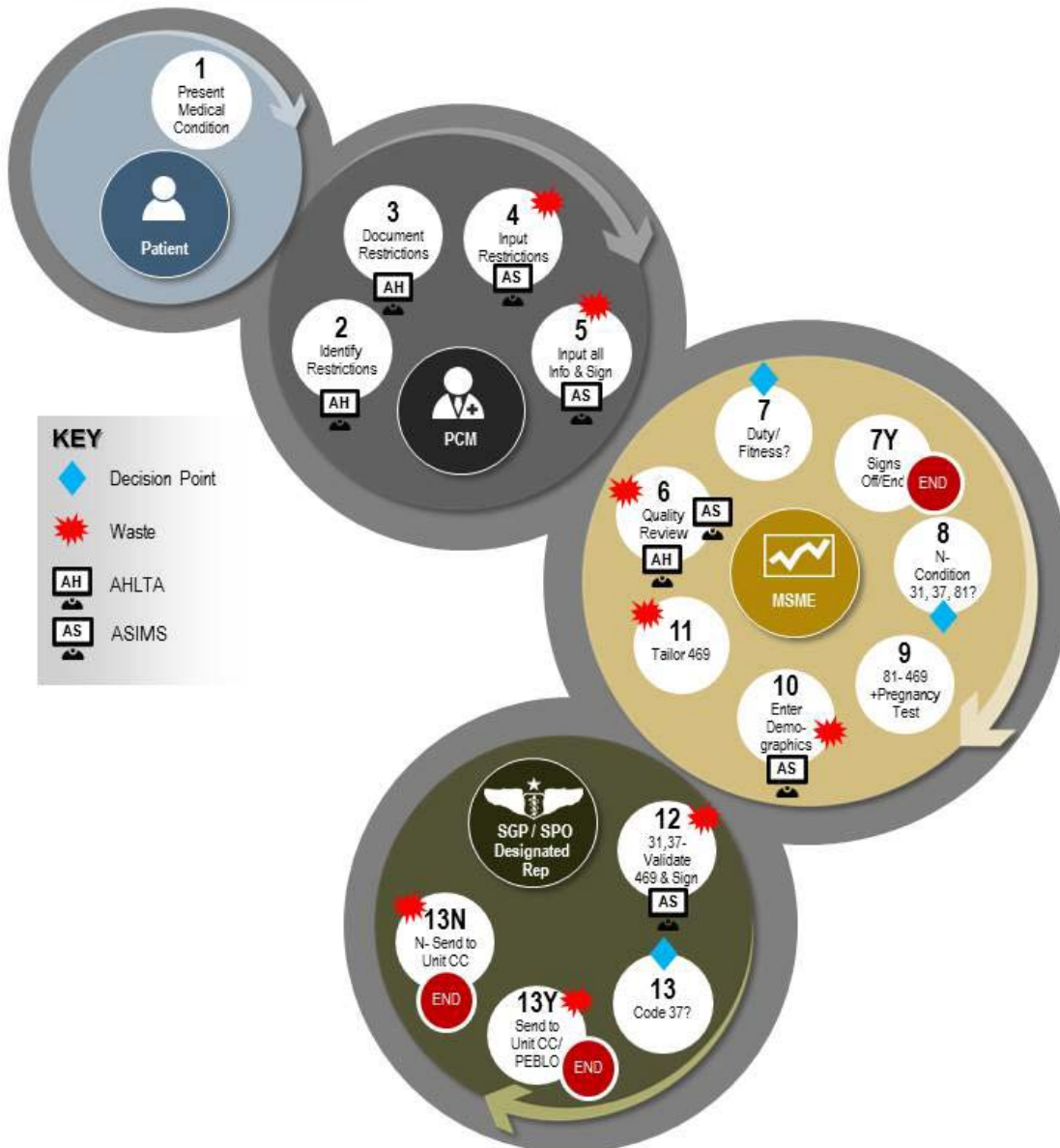
Figure 15: Observed Profile 469
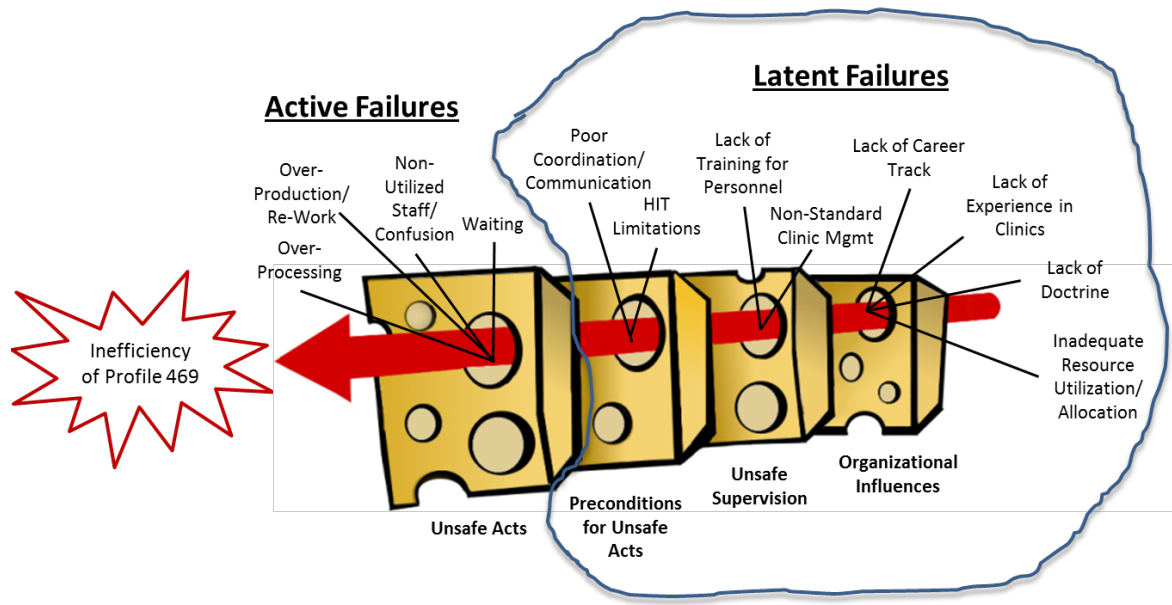
Figure 16: Profile Active and Latent Failures

2.2.5 Occupational Health and Medical Surveillance

In the absence of a collocated occupational medicine specialty clinic, the FOMC is responsible for providing core occupational medicine services for covered civilian employees and service members. Such services may include pre-placement, periodic occupational health and medical surveillance, fitness for duty, and pre-travel examinations. The Occupational Health and Medical Surveillance workflow is triggered by the temporal end of the prior surveillance period. It is comprised of a focused history, exam, and where indicated, ancillary testing to verify that an individual is medically qualified to perform their job and is without evidence of harm from occupational exposures.

Occupational Health Medical Surveillance - Baseline
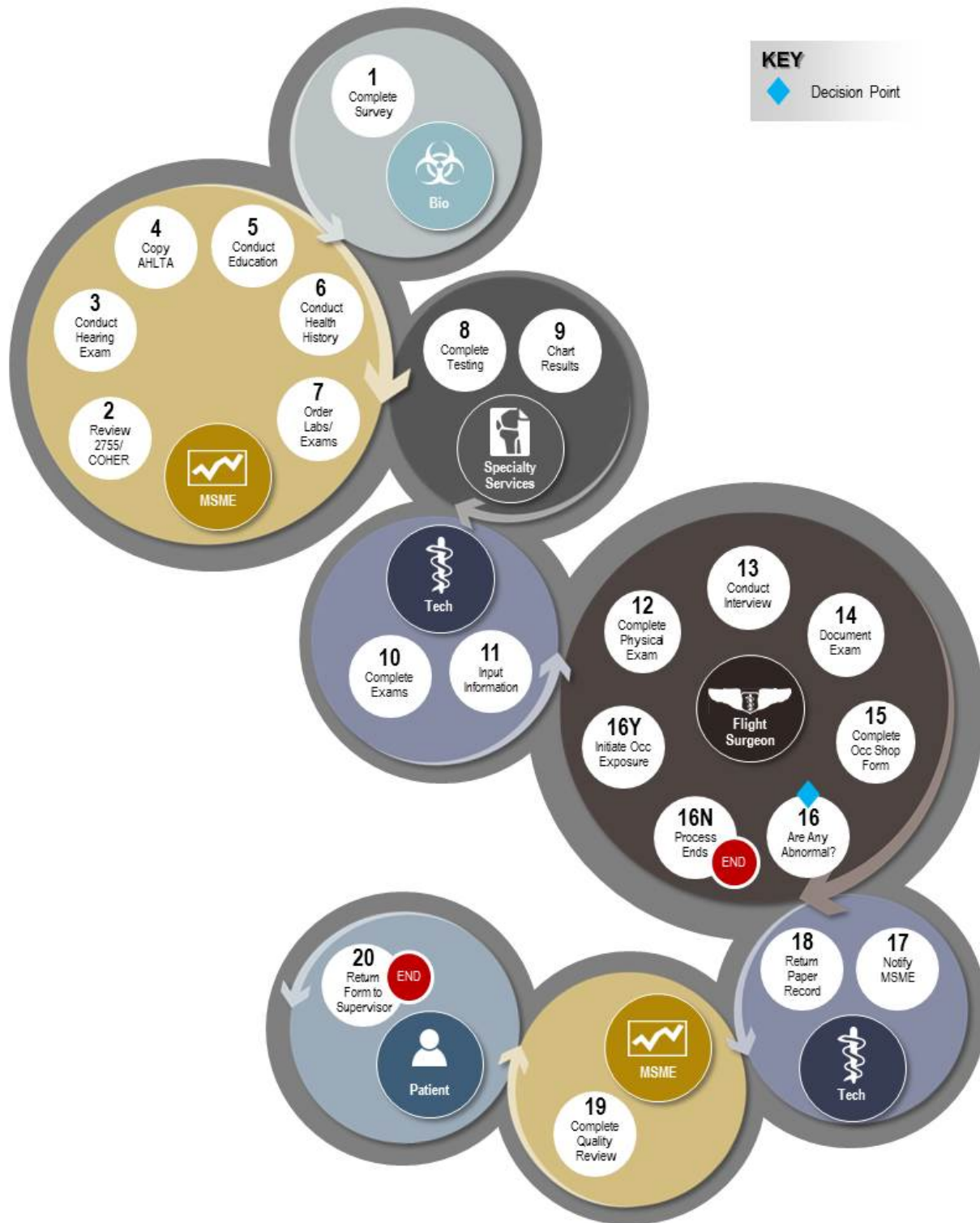
Figure 17: Baseline Occupational Health Medical Surveillance Exam

Occupational Health Medical Surveillance - Observed
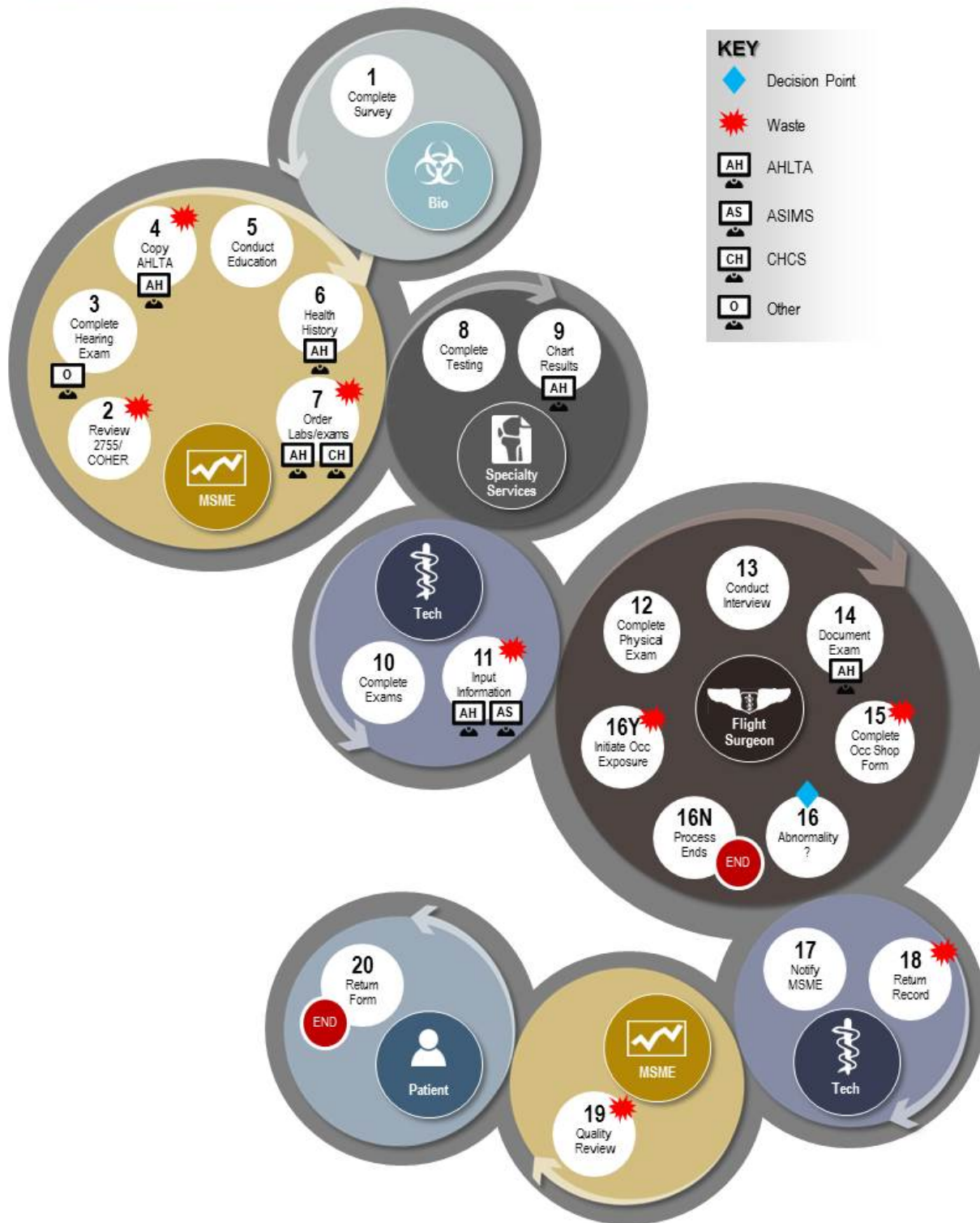
Figure 18: Observed Occupational Health Medical Surveillance Exam Workflow
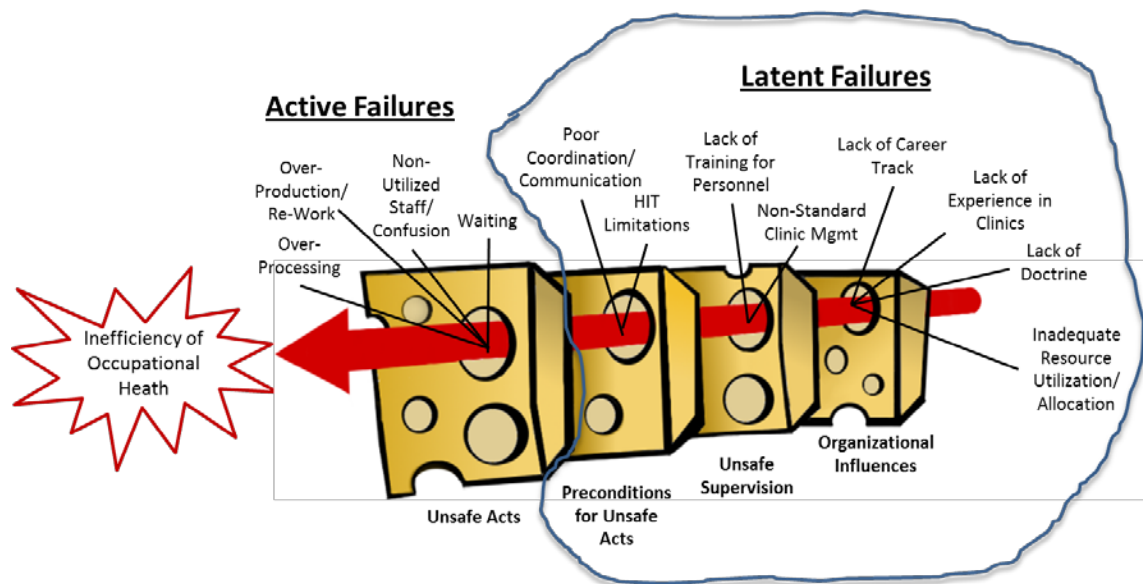
Figure 19: Occupational Health Medical Surveillance Active and Latent Failures

2.2.6 Personnel Reliability Program (PRP) Certification/Administrative Qualification

Personnel performing duties associated with nuclear weapons or nuclear command and control systems must complete an initial PRP certification process and then continuously maintain RPP certification status. Accordingly, the PRP workflow involves pre-placement, return to duty (RTD), and periodic occupational medicine-type exams. There are established exam standards, the guidelines are strict, and adherence is mandatory. The PRP workflow places heavy emphasis on the roles of Competent Medical Authority and Qualified Reviewer. Personnel on PRP status are responsible for self-reporting changes in health status and/or any episodes of medical care for assessment of impact on PRP status. Additionally, the FOMC is responsible for maintaining active surveillance for unreported episodes of acute care involving personnel on PRP status. It is difficult to manage individuals' PRP status with the current health IT systems.

PRP Certification/Administrative Qualification - Baseline

KEY
◆ Decision Point

Tech
1 Record Available?
1N File w/ PRP/PSP Monitor
2 Y-Locate Record
3 Prepare Record
4 Send to Dental and Mental

4C Mental
5 Review Documents
6 Is Interview Required?
6Y Interview Patient
7 N-Document Findings

4Y Dental
8 Review Documents
9 Is Appt Required?
9Y See Patient
10 N-Document Findings

SGP / CMA Designated Rep
11 Document Review
12 Is Patient Clarification Required?
12Y Interview Patient
13 N-PDI Found?
13N Qualifies Member
13Y Validate Findings
14 Sign/Forward AF 286
END

Figure 20: Baseline PRP Certification/Administrative Qualification

PRP Certification/Administrative Qualification - Observed

KEY
- ◆ Decision Point
- ✸ Waste
- AH AHLTA
- AS ASIMS

Tech
1. Record Available?
1N. File w/ PRP/PSP Monitor
2. Y-Locate Record
3. Prepare Record
4. Sent to Dental and Mental

4C Mental
5. Review Documents
6. Is Interview Required?
6Y. Interview Patient
7. N-Document Findings

4Y Dental
8. Review Documents
9. Is Appt Required?
9Y. See Patient
10. N-Document Findings

SGP / CMA Designated Rep
11. Document Review
12. Is Patient Clarification Required?
12Y. See Patient
13. N-PDI Found?
13N. Qualifies Member
13Y. Validate Findings
14. Forward AF 286
END

Figure 21: PRP Certification/Administrative Qualification
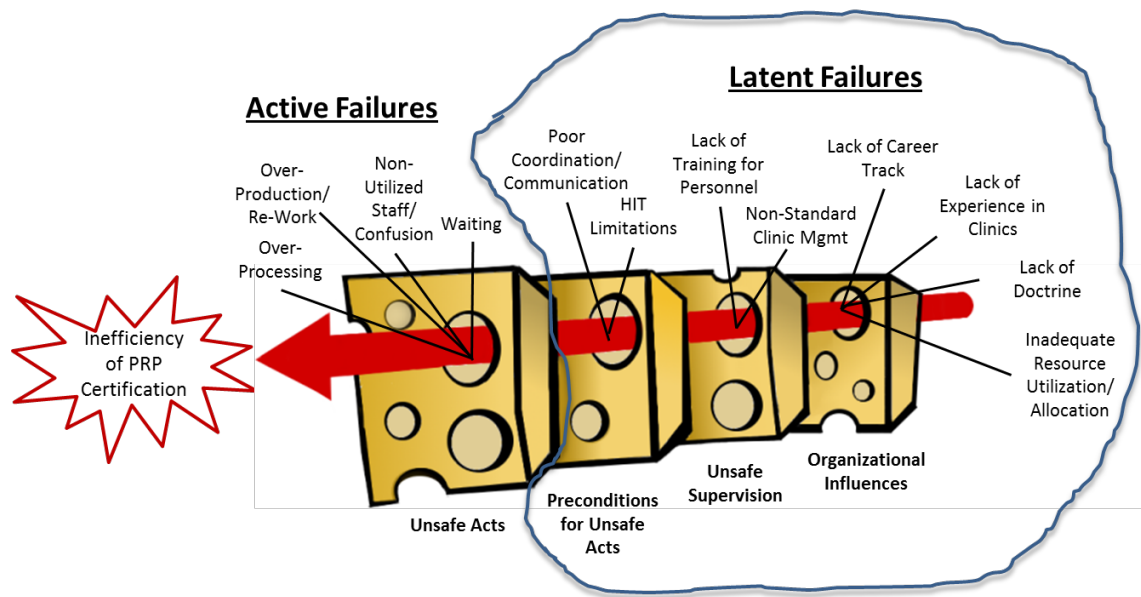
Figure 22: PRP Certification/Administrative Qualification Active and Latent Failures

2.2.7 PRP PHA

The PRP PHA workflow is the same as that provided in the standard PHA conducted at an FOMC, with the exception that the provider has to be certified to handle PRP information. The member arrives at the PRP clinic with a complete PHA.

PRP PHA - Baseline

Fly PHA

KEY

◆ Decision Point
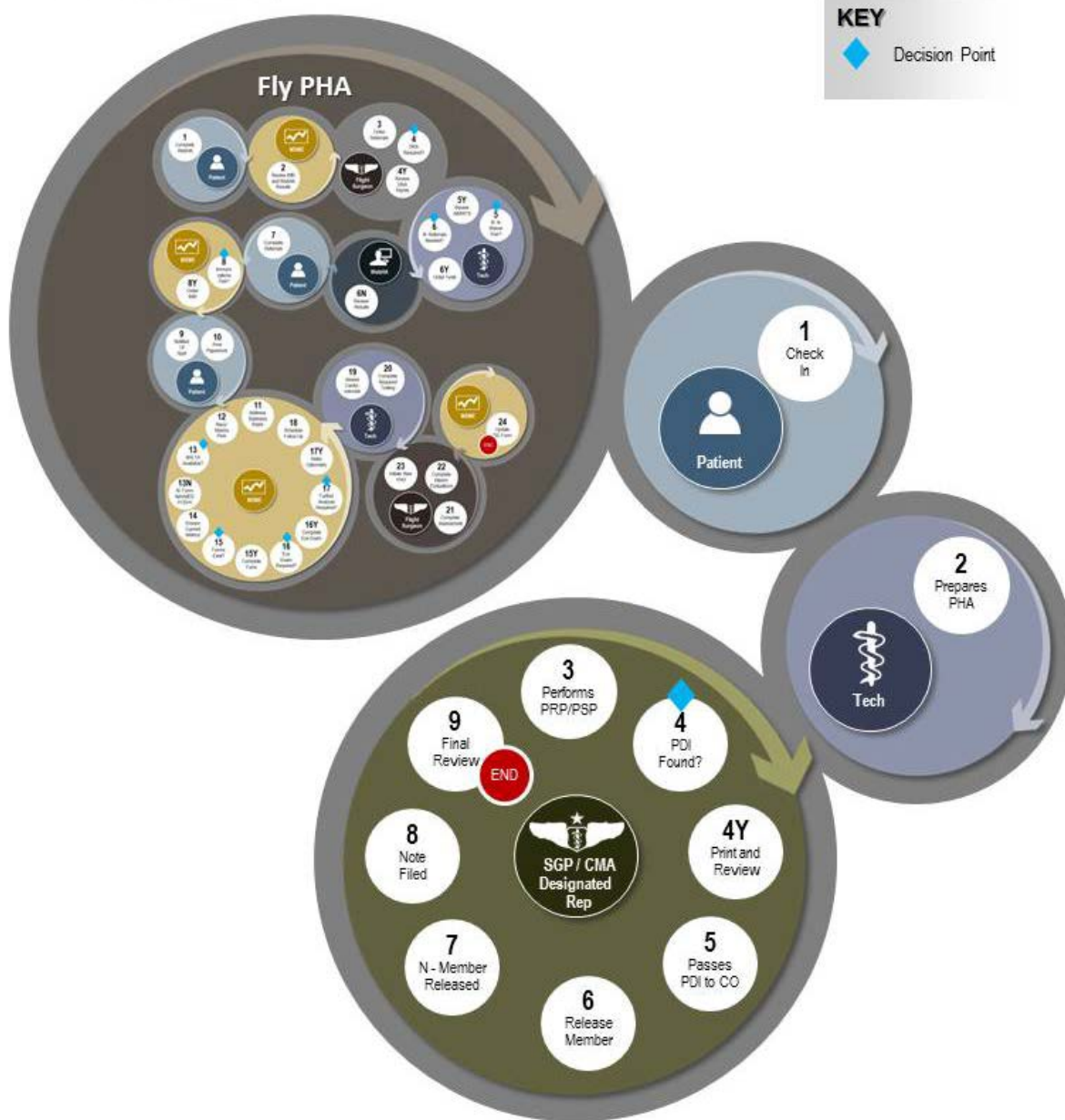
Figure 23: Baseline PRP PHA

PRP PHA - Observed
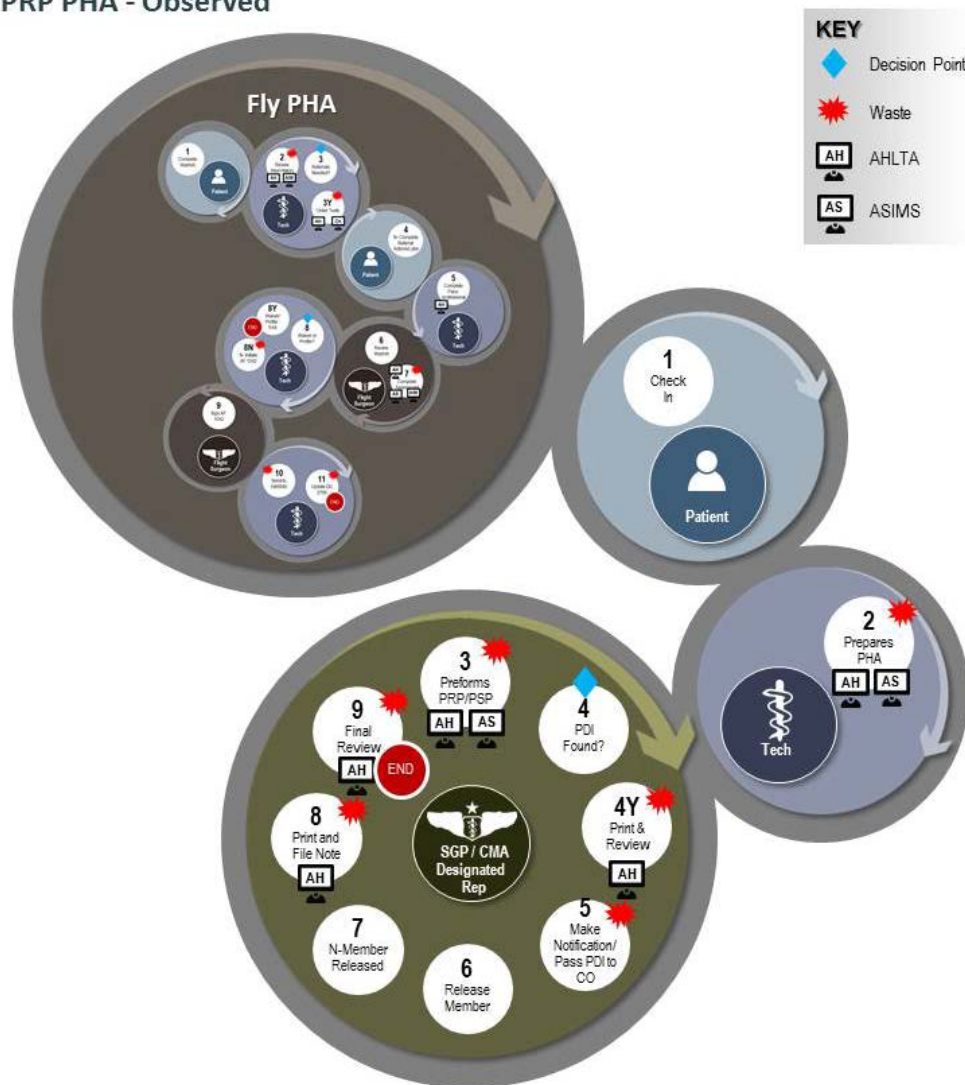
Figure 24: PRP PHA Observed
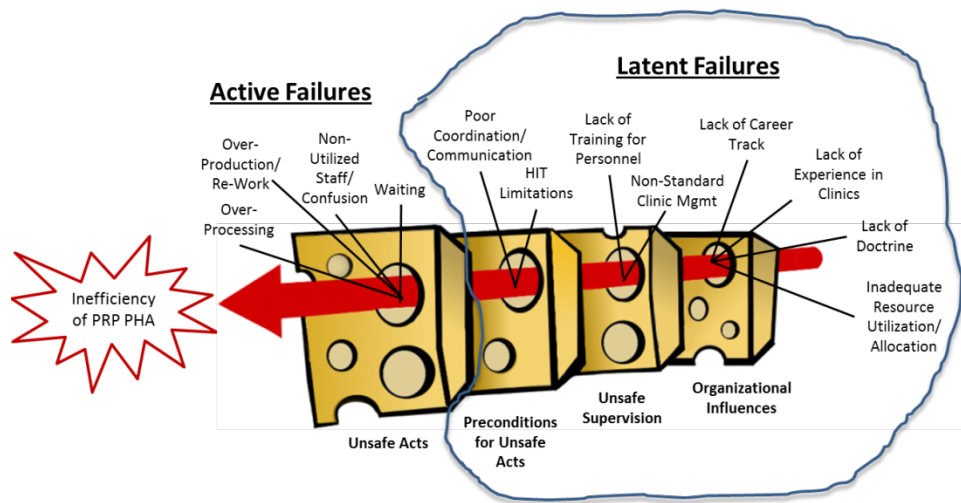
Figure 25: PRP PHA Active and Latent Failures

3 CONCLUSIONS AND RECOMMENDATIONS

This section presents the re-engineered "to-be" FOMC workflows followed by conclusions and recommendations organized using the DOTMLPF-P framework. The latter systematically address the latent failures driving waste in the current "as is" FOMC workflows. Enterprise-level leaders will need to holistically deal with these DOTMLPF-P issues as part of implementing the re-engineered workflows.

3.1 Re-Engineered Workflows

In its present form, the FOMC is an inherently complex system given its many constituent workflows, which were each independently constructed (based on distinct policies) but nonetheless interdependent in terms of shared resources (facilities, personnel, health IT, etc). However, such a level of complexity is both undesirable and unnecessary. Much of what is considered aerospace and operational medicine is simply occupational medicine applied to the domains of aviation and the military. If one maps the aerospace and operational medicine workflows to the archetypal occupational medicine exams, it is possible to dramatically reduce the number and complexity of FOMC workflows. What then distinguishes the exams are not the tasks but the standards or rules that are applied, which ideally should be addressed using health IT with embedded rules engines and decision support. Additionally, a single meta-exam workflow allows for team role consistency across exams, thereby decreasing the cognitive load on team members as they transition between patients during the duty day.

The following assumptions were accepted in re-engineering the workflows:

- A more capable health IT would be acquired in the future, providing a single, integrated user interface in place of the multiple, independent systems that reside in the clinic today. The assumption of increased capability underlies the allocation of tasks to health IT that today are accomplished through manual processes.
- Appropriate team members are CMA qualified, thereby reducing the need for PRP-unique variants of the workflows.
- Physician extenders are permitted to perform the professional elements of examinations under the direction of a Flight Surgeon or Occupational Medicine Physician.
- Occupational health nurse practitioners are permitted to certify and manage profiles.

The key to workflow consolidation was recognition of the following mapping:

- Pre-placement Examination: IFC and PRP Certification Administration/Qualification
- Periodic Occupational Health Assessment: fly-PHA, PRP-PHA, and Occupational Health Medical Exam
- Impairment/Fitness for Duty: Profile/469 and Aeromedical Waiver

Solution agnostic, functional workflows were created for the three principle workflows identified above. Further consolidation was achieved when it was shown that the same basic functions occur during a pre-placement examination and a periodic occupational health assessment. Thus, these two workflows were collapsed into a Pre-placement/Periodic Occupational Health Assessment workflow. Using the framework provided by the Four Habits of High-Value Health Care Organizations (Appendix A), two microsystems were developed, functions allocated to health IT, and tasks consolidated into roles that consistently mapped across workflows. The microsystems were designed around a patient-centered philosophy with occupational health services delivered using teams in which members practice at the maximum scope of their training and/or license. These teams differ significant from the legacy FOMC in the utilization of medical technicians, nurses, and physician assistants to accomplish the majority of the tasks; physician level tasks are few and primarily involve application of clinical judgment.

Figure 26 depicts the process map for the Pre-placement/Periodic Occupational Health Assessment workflow. The re-engineered workflow makes heavy use of health IT to plan and program clinical work as well as facilitate communications among team members and the examinee. All tasks shown in the process map are not required for every type of occupational exam; however, rather than create unique workflows, differences are addressed for any particular exam by considering the unnecessary tasks as still existing in the workflow, albeit with a null value assigned to them. This model allows a single exam rules matrix to drive a single workflow that is mapped to a single team whose members have consistent roles.

The team staffing the Pre-placement/Periodic Occupational Assessment microsystem should reside in a distinctly defined physical location with clustered patient exam rooms and collocated ancillary exam services (e.g., dental, optometry, audiology) adjoining a common work area, thereby providing shared situational awareness. The team's work area should also be in close proximity to that of the primary care teams to facilitate communication and care coordination. The Flight Surgeon or Occupational Medicine physician has a relatively constrained role: providing professional oversight and quality control and making disposition decisions for complex cases.   Accordingly, the physician is now capable of directing several teams, thereby increasing the potential throughput of this workflow.

Pre-Placement & Periodic Occupational Health Assessment Workflow

KEY
◆ Decision Point
HIT Health IT

2A Receives Notification (HIT)
5 Input Requested Info (HIT)
12 Schedule Exam Times (HIT)
Patient

2B Receive Notification
3 Determine Information Required (HIT)
6 Review Health History (HIT)
7 Is More Info Required?
7Y Collect Additional History
8 Is It A Categorical DQ?
8Y Certification Authority (END)
10 Tailor exam template
22 Validate Exam Complete
Tech

1 Determine Need for Exam
2 Select Type of Exam
4 Generate Questionnaire
9 Generate Exam Template
11 Identify Times Slots
13 Reserve Time Slot/ Resources
14 Generate Role-Specific Exam
21 Error Check
23 Apply Business Rules to Pt.
25 Care Plan Function
32 Care Coordination Function
Health IT

4Y Dental
4C Mental
Optometry
Audiology
Para Exam
Ancillary Services
Professional Exam
15-20 Conduct Exam (If Required) (HIT)

24 Form Assessment of Pt. (HIT)
26 Update Care Plan (HIT)
31 Case Mgmt Needed? (HIT)
31Y Case Manage Pt. (HIT)
31N (END)
Nurse/ Case Manager

27 Review Results (HIT)
28 Medically Qualified? (HIT)
28Y Go to Step 31 (HIT)
29 Is Accommodation Needed? (HIT)
29Y Go To Impairment/ Fitness Workflow (HIT)
30 Work/ Fitness Restrictions Indicated? (HIT)
30Y Go To Impairment/ Fitness Workflow (HIT)
FS/OM Doc

Speed
• Processing Time
• Lead Time
Quality and Outcomes
• Defects
• Patient Satisfaction
Metrics

33 Review Care Plan (HIT)
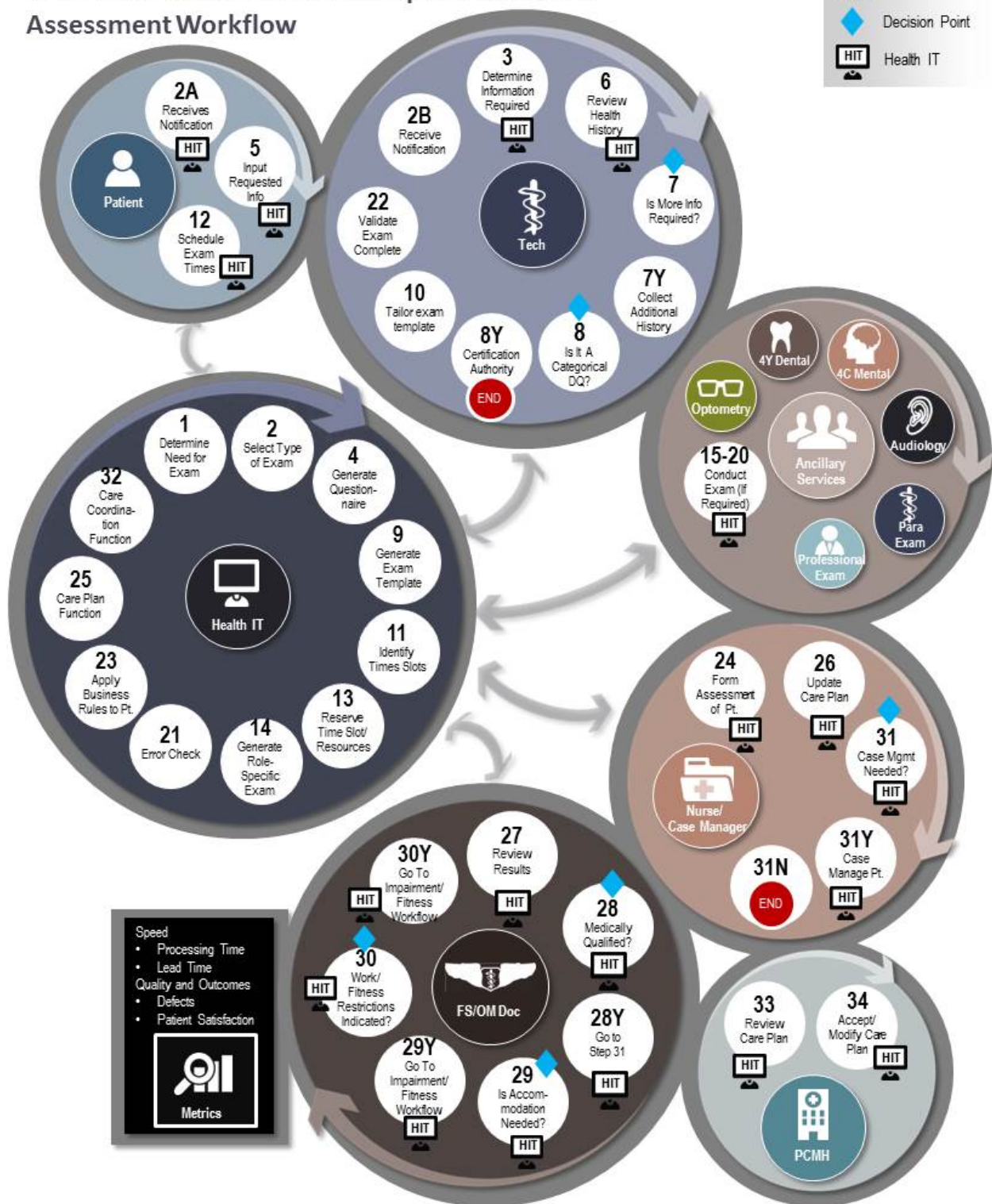**34** Accept/ Modify Care Plan (HIT)
PCMH

Figure 26: Pre-Placement and Periodic Occupational Health Assessment

Figure 27 depicts the process map for the Impairment/Fitness for Duty workflow. The re-engineered workflow utilizes concepts and terminology derived from the Americans with Disabilities Act such as temporary and permanent limitations, impairment versus disability, and fitness for duty evaluations and accommodation. These concepts and terms provide a means for consolidating several workflows dealing with work limitations in different sub-populations (i.e., service members, aviation special duty personnel, and civilian employees) into a single workflow.

The workflow also implements an occupational health case management function in the form of a dynamic patient panel comprised of members with temporary or permanent work restrictions; case management is comprised of both passive (health IT) and active (nurse) elements based on business rules. The occupational health nurse case manager coordinates with a member's primary care team to recommend treatment plans, monitor outcomes, and maintain a strong communication link among all the parties to include the member, their worksite, and their healthcare team. Care is delivered with the goal of returning the member to pre-illness or pre-injury function, or to the highest level of functioning achievable. Case management facilitates safe and timely return-to-work and results in cost savings when well executed and appropriate resource allocations are made to obtain rapid and effective medical interventions. The occupational health nurse case manager holds periodic case reviews with the respective primary healthcare teams. The case manager will also educate the supported primary healthcare teams on occupational trends observed in their respective empanelment.

In contrast to the legacy FOMC, the Impairment/Fitness for Duty microsystem is administered and managed by an occupational health nurse practitioner under the professional oversight of a Flight Surgeon/Occupational Medicine physician. The latter is primarily responsible for accomplishing the physician component of the impairment exam (Narrative Summary, Aeromedical Summary, Civilian Accommodation Recommendation), which is then communicated using health IT to the appropriate accommodation authority based on examinee demographics. Thus, the re-engineered workflow reallocates responsibility for the impairment exam from the primary care team to an independent examiner, thus resolving any potential for conflict of interest. It also significantly decreases the number of people involved in both executing and managing the process.
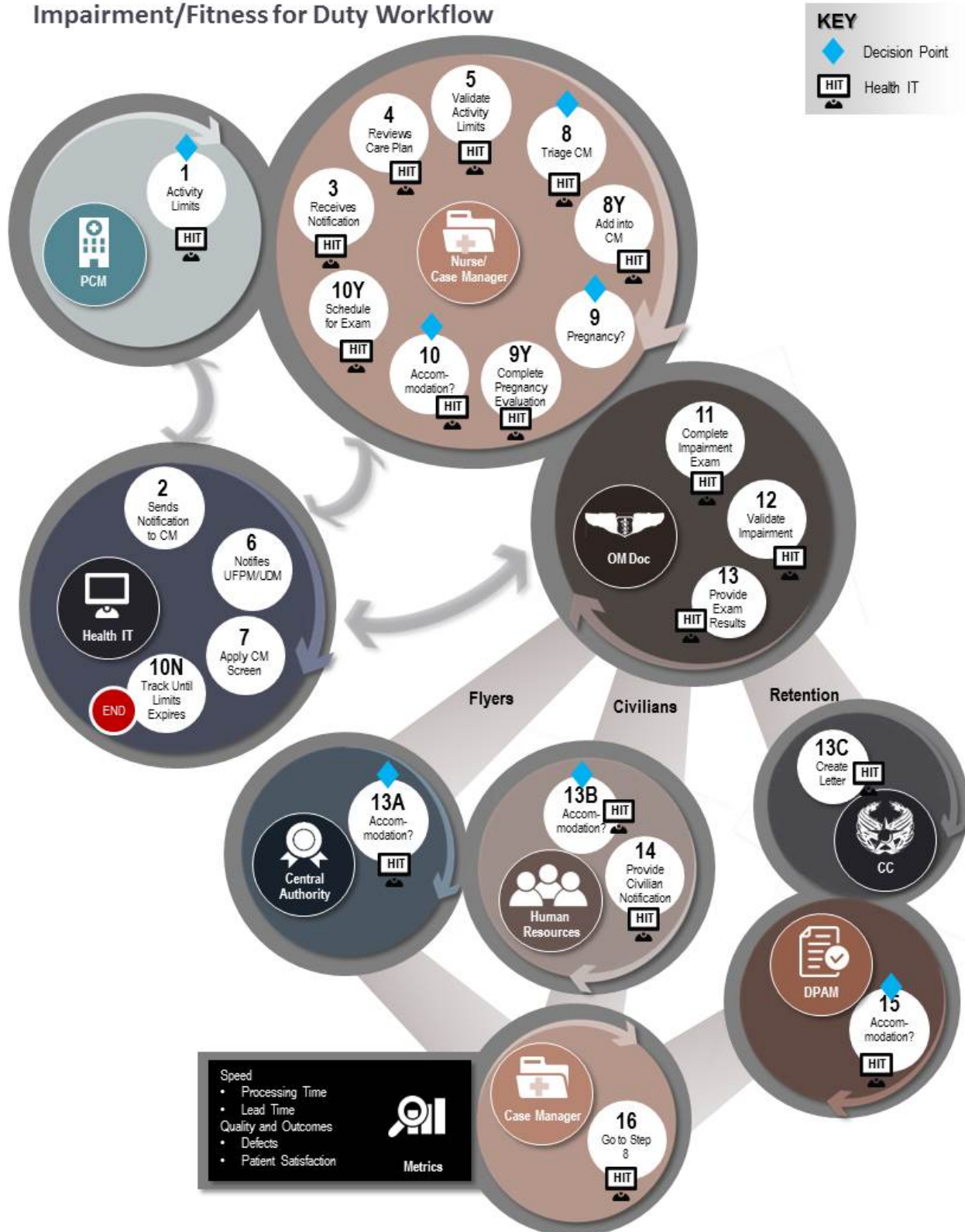
Impairment/Fitness for Duty Workflow

Figure 27: Fitness for Duty and Accommodation

3.2 DOTMLPF-P Framework

DOCTRINE

To appreciate the impact of doctrine on the function of the FOMC, we must understand the definition of doctrine and its purpose. Fundamentally, doctrine is what is officially approved to be taught and is based on what has worked best in the past – in other words, doctrine is derived from experience, whether from actual operations or exercises. So, for example, as air-to-air combat matured and fighter pilots gained more knowledge and experience, doctrine was formulated to describe the best maneuvers to use to gain the advantage over enemy aircraft. The purpose of doctrine is twofold: to guide decision-makers in how to proceed in any given situation, and to give everyone in a system or unit a common basis for action when faced with problems. Doctrine should not be confused with strategy; strategy tells *what* is to be done – doctrine tells *how* to do it. Doctrine is not mandatory; it represents the benchmarks of experience. Doctrine is also dynamic; as experience accrues or technology advances, doctrine is up-dated. Stale doctrine is stale practice.

Doctrine can exist on multiple levels, such as basic, operational, functional, and joint. For instance, Air Force Doctrine Document 4-02, Medical Operations, is basic doctrine describing the best way to deploy the AFMS to achieve the objectives of sustaining a fit and healthy force, preventing illness and injury, restoring health, and sustaining human performance. However, at the functional level, the level of the FOMC, there is no doctrine. There are Air Force Instructions – AFI 48-101, AFI 48-149, and AFI 48-123, for example – but the instructions tell what to do, not how to do it. For instance, AFI 48-149, Flight and Operational Medicine Program (FOMP), states that the Aerospace Medicine Squadron Commander will establish clear objectives and goals for the FOMC, define tasks and responsibilities necessary to achieve the objectives of the FOMC, and reassure effectiveness of reaching the objectives and desired effects, among other things. The rest of the AFI lists a potpourri of activities and working groups in different programs: flying, operational, and special duty; occupational and environmental health; force protection; community health; human performance; and emergency response and disaster management. But there is no doctrine for the best way to put all the programs into action, achieve the intended outcomes, utilize the available manpower and personnel in the most efficient and effective manner, and do it all with the most value. Leaving it up to the experience of the squadron commander or SGP might work, but there is no sense in leaving the AME up to chance.

Lack of doctrine for managing a FOMC was seen at every installation visited in this report.

RECOMMENDATION D-01
Gather and analyze best workflow practices, factoring in outcomes that matter to the Airman and the line commander; appropriate manpower utilization; training staff in clinic operations; and effective use of health IT.

RECOMMENDATION D-02
Publish doctrine for executing the AME across all FOMCs, based on the evidence collated in Recommendation D-01.

RECOMMENDATION D-03
Identify affected Air Force policy documents and instructions to be rewritten or replaced in order to reflect doctrine (see recommendation under Policy).

ORGANIZATION

To organize, according to Webster's dictionary, is "to form into a coherent unity or functioning whole; to arrange by systematic planning and united effort." Based upon this definition, all of the sites visited were disorganized. There was no coherence because the existing guidance doesn't lead there. AFPD 48-1 constructs the AME with four effects and six programs, erecting a fractured structure for the overall enterprise of what is essentially occupational medicine. The "subsequent supporting guidance" (primarily AFI 48-101, AFI 48-149 and AFI 48-123) only adds to the confusion, providing no unifying theme, no definition of exactly what the goal of the AME is or *how* it is achieved by the flight and operational medicine clinic. The guidance to squadron commanders and the SGP is to ensure that the AME is executed using "established principles of program management." There follows a litany of acronyms by which this will be performed: the Aerospace Medicine Council (AMC), Occupational and Environmental Health Working Group (OEHWG), DAWG, Population Health Working Group (PHWG), and Flight and Operational Medicine Working Group (FOMWG), to name a few.

What was observed was primarily the SGP (if that person was present for duty) trying to simultaneously run six programs with various degrees of assistance from the aeromedical squadron commander, often hindered by manpower and facility restrictions, and guided only by his own experience and training as modified by his personality. Therefore, there were six different ways of running the AME through the FOMC, using different combinations of personnel serving different subpopulations of patients, and with varying degrees of success in terms of job satisfaction. Medical personnel in the six FOMCs were process-oriented rather than outcome-driven, trying to accomplish the heterogeneous tasks of the day to produce process metrics such as rates of completed occupational exams, shop visits, risk assessments, or Mission Essential Task Lists.

In no two clinics were the same workflows used to accomplish the subroutines of the clinic, such as registering the patient, rooming the patient, IT utilization, or finalizing the medical record. No best practices were noticeable in the utilization of the FS or contract Physicians, Physician Assistants, or nursing personnel, both in patient care or administrative duties. [There was one notable exception: at one base, two General Medical Officer Flight Surgeons analyzed their patient population and produced an AF Best Practice in streamlining care for return to flying status, air sickness, and commander's action program; however, the AF Best Practice was not disseminated to other FOMCs in the MAJCOM.] Otherwise, patients were seen heterogeneously and, with the exception of one site, there was no population health analysis. At all sites there was an underlying current of frustration and a lack of continuity of care. In short, despite the term Team Aerospace, there was little evidence of teaming, and this, in turn, was driven by disorganization.

Disorganization was observed at a more macro level at several locations. At one base, there were multiple commands, and each command had their own clinic; however, the FOMC was responsible for all personnel on flying status or special duty, as well as North Atlantic Treaty Organization (NATO) personnel and reservists. Although not a joint base, there were sister service members empanelled to the FOMC, requiring physicals according to their service standards and forms. Consequently, there was friction rather than ordered flow at the conjunction of the several clinics, leading to bottlenecks and consternation in the execution of the AME, amplified by the lack of IT interoperability. Another base had FS assigned to the line under the operational support squadron and, although their medical command and control fell ostensibly under the medical group and, in particular, the FOMC, there was friction and underutilization of that set of FS, and probably lack of proper oversight. Two bases had sizeable clinics at other sites dedicated to large training populations that fell under the purview of the FOMC with problems associated with manning and fulfilling the four effects and six programs of AME policy.

Disorganization hobbled the overall provision of health and performance to the enrolled populations.

RECOMMENDATION O-01
Organize the FOMC around the Four Habits of High Value Health Care Organizations[1] (see Appendix A).

RECOMMENDATION O-02
Adopt and accommodate the recommended future workflows in this report. Because a robust health IT/EHR system is unavailable, analyze the best way to institute new workflows with incongruent technology while annotating future requirements.

RECOMMENDATION O-03
Perform manpower, personnel, and training tradeoff analyses. Workflows and their associated outcomes are facilitated by a team approach. Therefore, a study of the proper mix of clinical staff, Technicians, and administrative personnel with core knowledge and requisite team training is mandatory. There should be a strategy for stabilizing the workforce over time (maintaining consistency and experience by modifying ops tempo, PCS, and career-broadening AFSC-specific moves within the medical group). Closely tied to a tradeoff analysis is the institution of a cost/value matrix.

TRAINING
While clinical leadership (specifically the squadron commander, SGP, and flight commanders) appeared to be medically competent, the same cannot be said for competence in managing clinic operations, i.e. the efficient and effective means of producing value-based outcomes that matter to Airmen and their commanders, and job satisfaction for the clinical staff, including the Technicians (see Leadership and Education).

Core training for all personnel appeared to be sufficient; that is, all clinical providers and Technicians were trained to their present skill level. However, there were deficiencies in other types of training such as the use of IT – many clinical providers used the multiple computer databases in differing ways and to differing extents, almost always confined to their comfort level with the database, which correlated to the amount of training they had on the system. The younger FS were comfortable with AHLTA but not CHCS, whereas the older FS tended to be the reverse. None of them exploited the full capabilities of AHLTA because they had little to no training, didn't have the time, or didn't believe a certain capability was value-added. The Technicians generally fell into the same categories.

Another training deficiency was that some personnel were not utilized to the full capacity of their training. For example, at one clinic there were three IDMTs who were not used in that role, but still had to maintain their knowledge, skills, and abilities, and a PA who was not utilized to the full extent of his training. FOMC nurses openly admitted that they had no job description and had to improvise their role/duties. Therefore there was waste in training.

The lack of team training in the workflows of the clinic was exemplified by the morning huddles consisting of 2-3 minutes of acknowledging who was in clinic, which Technicians were assigned to what Physician, and occasionally the types of exams for the morning. An exception was the huddle at one base led by a Nurse case manager who was responsible for clinic operations, including scheduling, during which patient issues were discussed as a team.

Workflow bottlenecks occurred frequently at the interface between clinicians and Technicians because of deficient training in their respective roles.

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[1] Bohmer RMJ. The four habits of high-value health care organizations. N Engl J Med 365;22, December 1, 2011, available at http://www.nejm.org/doi/full/10.1056/NEJMp1111087

Lack of training in clinic operations, especially with respect to teaming, was detrimental to the overall facilitation of clinic processes.

RECOMMENDATION T-01
Conduct training for all FOMC clinic personnel, incorporating the outcomes of the three Organizational recommendations: clinic protocols and metrics, patient population, workflows, clinic teams, and a learning environment. Include protocols defining the roles and responsibilities of the team members, rules for communicating and decision-making, an understanding of individual duties and how they contribute to clinic success and patient outcomes, and the effective use of health IT. Such training should be transportable across FOMCs. This recommendation is facilitated by Recommendation L-01.

MATERIEL
The single greatest materiel deficiency was health IT. Health IT should have the capability to capture all health data types (demographic, occupational, physiological, etc.), have liquidity (information transparently transportable across applications); be adaptable to multiple workflows; be analyzable (for disease, outcomes, cost, decision-making, and resource allocation utilizing 'big data'), contain embedded knowledge (practice guidelines, decision-support tools, case management tools, etc.), and always be available (no downtime). Additionally, the system should optimize the clinical team's time – with the patient, documenting the encounter, and learning and innovating. Therefore, information must be accurate, available, easy to locate, and interpretable. AHLTA, AIMWTS, PEPP, ASIMS, AERO, Health Artifact and Image Management Solution (HAIMS), MiCARE (electronic messaging service), and WebHA were not seamlessly integrated, were not reliable, required paper backup and work-arounds, and had to be individually accessed by Common Access Card (CAC). Technicians relied upon Google for certain sets of information, and clinicians resorted to other professional sites on the Internet for clinical decision aids. Health IT was not portable, except for one provider who utilized a laptop in the only clinic with wireless capability. Clinicians were compelled to complete the electronic record in their offices, except in one clinic where the clinician used the computer in their single examination room. The consensus was that health IT slowed the process of healthcare delivery.

Materiel for clinical assessments was sufficient overall, except for one clinic where a clinician stated that the minor treatment room was not stocked for common procedures.

Deficiency in materiel, specifically supporting health IT, was detrimental to overall clinic efficiency. Although impact on patient outcome is probable, it was not observable or measurable.

RECOMMENDATION M-01
Acquire an integrated electronic health record that accounts for the scope of the AME. Given that acquisition of an EHR resides at the DoD level, and that the DoD is currently opting for a commercial off-the-shelf solution, then a module incorporating the needs of the AME should be specified. Appendix B presents general requirements/capabilities and conceptual designs as a starting point. An EHR should be interoperable with the larger health IT and facilitate FOMC workflows, data capture, and analysis requirements.

LEADERSHIP AND EDUCATION
As a rule, the FOMC leadership did the best they could with what they had. Within the existing AME (as defined by policy directive and AF instructions) leadership at the level of squadron commander and SGP were busily discharging their duties as specified in official guidance. They were constantly going to meetings, rarely saw patients, and had as many styles and methods of managing as there were sites visited, ranging from aggressive omnipresence to quiet persistence. Inadequate manpower and clumsy IT were accepted as irreparable facts. There was little evidence of innovation except at one site where the SGP engaged in root cause analysis and instituted a robust medical evaluation board process.

The Noncommissioned Officer In Charge (NCOIC) at each site was a capable and motivated leader of the enlisted cadre. Noteworthy was the ability to capitalize on individual Technician strengths to bridge gaps in a broken system; for instance, a Technician with savvy computer skills developed a local form to facilitate the gathering and entry of data into a computer program.

Overall, the leadership maintains the status quo. There does not appear to be a standardized and rigorous preparation for leading and managing a high-value clinic. The SGP Guide is a liturgy of the components of an aeromedical flavored occupational medicine program, with the exception of a chapter on leadership emphasizing the need for a clear mission statement and the importance of committee meetings, operating instructions, and communication. Cleary FOMC leadership needs professional education along the lines of the Four Habits of High-Value Health Care Organizations.

Lack of leadership education in the effective and efficient management of a clinic was detrimental to the FOMC mission.

RECOMMENDATION L-01
Develop professional education for leadership Medical Group Commander (MDG/CC), Squadron Commander (SQ/CC), SGP and Flight Commander (FLT/CC), and NCOIC) in the functioning of the FOMC, incorporating the four habits of high-value health care organizations. The effect of the training should be reproducible across all FOMCs. This recommendation should facilitate Recommendation T-01.

PERSONNEL
Manpower and personnel were major obstacles to the execution of the AME and functioning of the FOMC. The demise of the 4F (Flight Medicine Technician) career field created a loss of experience and expertise in the FOMC that has not been recaptured with the substitution of 4N (Medical Technician) and 4E (Public Health Technician) career fields. Most of the clinics observed suffered from lack of experience in depth, and in some cases there were not enough Technicians. Additionally, once techs were adequately trained, career field functional managers rotated techs to other positions within the medical group for "career broadening," with the knock on effect of having to train new techs in the FOMC. In general, there was a discontinuity between the roles of the Technicians and the clinical staff in terms of executing the AME.

All but one FOMC supplemented the FS cadre with contract Physicians and/or PAs, highlighting the fact that ostensibly there was more work than the assigned or available FS could accomplish alone. Contract Physicians/PAs saw the most clinical encounters; one contract Physician stating this was the case in order to maintain his Relative Value Units (RVU) for compensation purposes. It is beyond the scope of this report to comment on the cost/benefit ratio of contract clinicians, but it does infer that either the manpower model is faulty, or operational tempo (requiring FSs to deploy) is abnormally high and sustained. Every FOMC except one had one or more FS deployed in varying capacities (to the area of responsibility (AOR), on a safety investigation board, manning assist), were inbound with training enroute, or were on maternity leave.

Manpower disutility in other clinics affected one FOMC by having to matrix an internist FS to the internal medicine clinic three times per week with one day per week in the FOMC. Another non- Residency in Aerospace Medicine (RAM) Obstetrics and Gynecology (OB/Gyn)-trained FS was acting SGP, profile officer, Competent Medical Authority (CMA), and oversaw the OB/Gyn and Women's Health Clinic. All of the squadron commanders and/or SGPs rarely saw patients on a routine basis due to leadership and administrative load.

Manpower and personnel affected continuity of care. At one clinic, when the pediatric clinic was amply manned they saw all patients under the age of 18; however, with a provider shortage, they changed to only children under the age of 8, with all others pushed out to family practice and Flight Medicine.

At three bases, the FOMC detailed FS to satellite clinics, two serving student populations and one serving a Remotely Piloted Aircraft population. At another FOMC, FS assigned to an operational support medical flight for the purposes of recurrent deployments, rarely augmented the FOMC when in garrison, although two of the FS would see patients two days a week.

Personnel had a negative effect on the function of the FOMC.

RECOMMENDATION P-01
With the outcomes of Recommendation O-03, formulate an AFMS-level strategy and plan for improving the utilization of manpower and personnel to fit the mission of the AME as carried out by the FOMC. This requires an understanding of the ideal team mix for executing the mission at the FOMCs across the entire enterprise and ensuring the capability of the local leadership to manage the workforce.

FACILITIES
Clinic facilities differed markedly from site to site with little commonality in terms of flow of patients through physical space. Except for the point of registration, design layout for Technician work space, screening rooms, examination rooms, and Physician offices were dissimilar. Some clinics were purpose-built as medical facilities and others were reclaimed space, such as a prior base exchange. Ancillary services may have been co-located in the same building or separated. In all cases, the physical layout contributed to inefficiency. At one site, only one exam room was available per Physician so that the next patient could not be placed in the exam room until the previous one had vacated. Flight Surgeons stated that there was not enough rooms or that the rooms were ill-suited, such as the location of a minor treatment room. At one site there was no minor treatment room.

Clinicians were forced into excessive motion because offices and exam rooms were not in close proximity. Clinicians recorded the encounters in their office, except for one site where there was only one exam room. In some cases, clinicians shared office space. Exam rooms were not dedicated to clinicians, except at one site where the contract Physician was the only one seeing patients during the observation period. Colored flag systems were available but were either unused or inconsistently used except at two sites.

The location of Technicians varied from site to site; some were located in a separate workspace remote from the clinicians, and some were markedly space-constrained. One FOMC had technician work space in the hallway where patients and staff pass through.

Understandably, infrastructure is difficult to change, but workflows need to be defined and understood by the medical team so the infrastructure and workflows can be accommodated as best as possible with a plan for future renovation, if indicated.

RECOMMENDATION I-01
An AFMS central medical facilities board should deliberate on the minimum requirements for clinic space predicated on a team-based, medical home model with the goal of standardizing FOMC facilities across the enterprise.

RECOMMENDATION I-02
Institute a tiger team at each FOMC to analyze the physical infrastructure and make requisite changes within budgetary allowances to accommodate future workflows. Where infrastructure change is too

costly, other mitigation strategies should be introduced with a future years' plan for renovation or new construction.

POLICY

Lack of policy for how Flight Medicine clinics operate in terms of common workflows, space allocation, manpower utilization, and the potential for data analysis of patient populations contributed to inefficient operations, confusion, and some exasperation. Although the end products as defined by AFIs – waivers, profiles, occupational exams, and the like – were performed, there was waste in time, continuity of care, service to the patient population, and, by inference, an increased cost. No data was available to assess the quality of the outcomes.

RECOMMENDATION PO-01

Write and publish policy for operating the FOMC. AFPD 48-1, AFI 48-101, and AFI 48-149 will likely be affected and should be rewritten, replaced, or deleted. Policy should be coherent with doctrine published as a result of recommendation D-02.

4 Appendix A: Discussion of the FOMC Future State

Rectification of the DOTMLPF-P deficiencies detailed in the Conclusions and Recommendations section of this report will take time and a step-wise approach. To be noted up-front is the need for standardized processes across all FOMCs with capable, trained leadership mandated to govern clinic processes to achieve quality outcomes in an efficient manner marked by value. Hand-in-hand with development of the future FOMC, doctrine and policy must be codified and promulgated across the enterprise. Doctrine and policy, leadership, and standardized processes establish coherence in the FOMC.

The Four Habits of High-Value Health Care Organizations, as outlined below, lend a proven framework for reformulating the FOMC.

SPECIFICATION AND PLANNING

To reduce confusion and friction, operational and clinical decisions are predefined to include such processes as workflow, the use of clinical algorithms and decision aids, and the establishment of homogeneous subpopulations of patients. For example, a population served by an FOMC could be defined by like groups such as pilots or remotely piloted aircraft (RPA) operators or space operators. As much as possible, workflows for occupational exams, profiles, and waivers, as well as for the most common acute care encounters, are created to streamline effort, standardize processes, and emphasize outcomes. The re-engineered workflows, presented in the Technical Document entitled "FOMC Task Process Mapping", are a starting place for the common processes in the current AME. Clinical decision aids, algorithms, and business rules are built into the supporting health IT and EHR underpinning the enterprise.

INFRASTRUCTURE DESIGN

Rather than a one-size-fits-all clinic, the subpopulations and pathways defined by specification and planning are supported by intentionally designed microsystems incorporating facilities, staff, health IT, and policies that combine to execute the AME. Here is where the manpower, personnel, and training deficiencies of the current system are resolved by tailoring teams to each subpopulation. Successful teams have strong and capable leadership, protocols defining the roles and responsibilities of the team members, rules for communicating and decision-making, and training so that all team members understand their duties and how they contribute to team success and patient outcomes. Team members work at the maximum of their license, skill, and abilities with the training and authorization to execute their role. Workflows, standing orders, and protocols provide clarity, standardization, and simplification of the flow through the FOMC. Additionally, team members are involved in continuous improvement of workflows. Likewise, the physical infrastructure may be reconfigured to accommodate patient flow, minimize chokepoints, and facilitate integration and communication between teams, ancillary services, and the patients themselves. Of course, health IT and the EHR should be seamlessly woven into the infrastructure design to facilitate the delivery of AME outcomes.

In distilling the re-engineered workflows, the team found that the core team could consist of a case manager, technicians, providers, and the SGP or occupational medicine physician, utilizing ancillary services as determined by the respective workflows. Specific subpopulations may require additional team members, like sports physiologists and therapists or behavioral health, and they may be shared assets across multiple teams. An overall clinic manager who oversees daily functioning of the clinic mitigates bottlenecks and maintains the overall flow through the clinic; such a position could possibly be rotated through the several case managers.
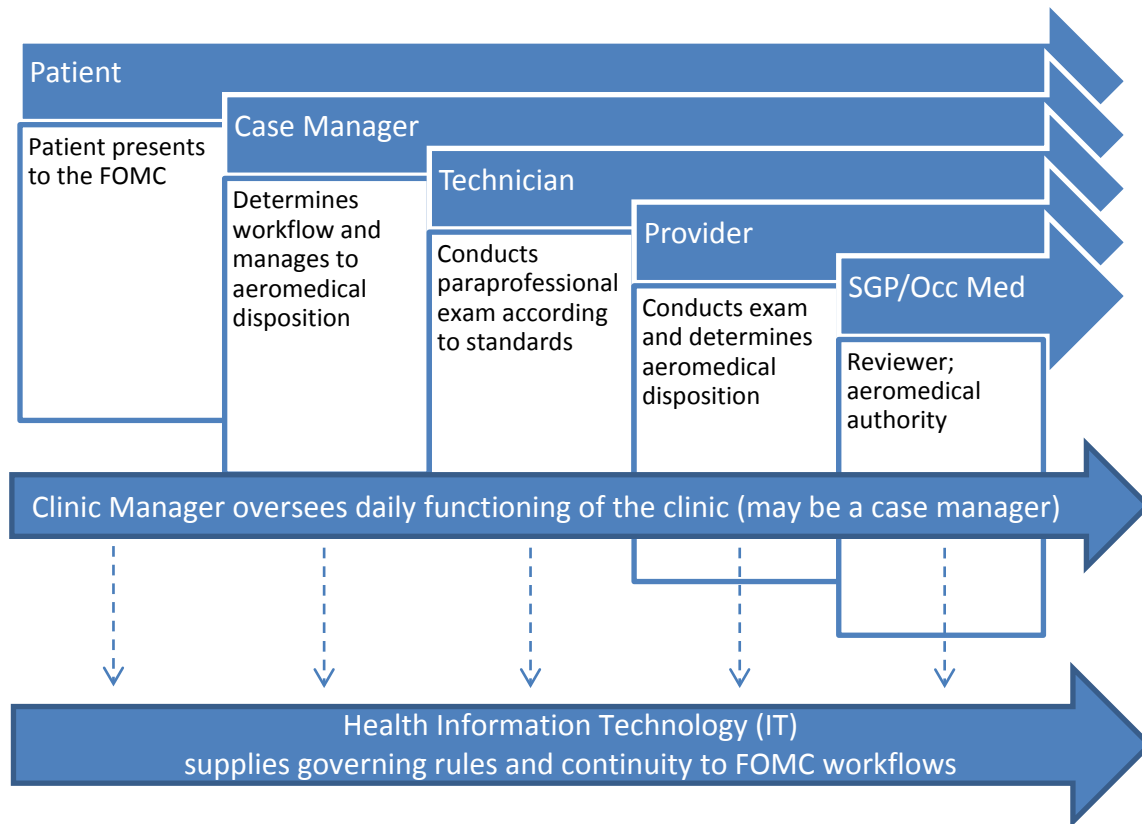
Figure 28: FOMC Clinic Role Description

As they stand today, health IT and the EHR single-handedly weaken the future FOMC and must become an integrated, interoperable system. See Appendix B for EHR Recommendations

MEASUREMENT AND OVERSIGHT

Many reporting requirements are imposed upon the FOMC from external agencies. However, the future FOMC should derive internal metrics to assess the quality of processes, performance, and clinical outcomes. Health IT ought to capture epidemiological data, enabling the teams to analyze the care provided to their population. Possible metrics might include operational availability rate, injury rate during training, preventive and performance enhancement services delivered, return to duty time, and patient and line commander satisfaction. Whatever the metrics, the results should advertise how well the clinic is performing the mission and contribute to continuous improvement.

KNOWLEDGE AND INNOVATION

The AME as represented by the collective FOMCs should establish a cultural environment that fosters innovation across the board (clinical guidelines, processes, and workflows; improvements in teaming; new uses of health IT; and infrastructure design) and then provides the means of disseminating innovation across the enterprise. Collected organizational knowledge is disseminated to achieve selfless improvement and innovation for both the healthcare team and the patient. The essence is for the healthcare teams to accumulate and share knowledge and insight, to practice root cause analysis, and to innovate new solutions aimed at improving the performance of their specific subpopulation.

5   Appendix B: Electronic Health Record (EHR) Recommendations

Introduction

The right health IT is absolutely necessary for the effective and efficient operation of the FOMC, and it is essential to the implementation of the re-engineered workflows. The existing FOMC health IT is a primary contributor to many of the wastes observed in the current workflows. Accordingly, the AFMS should ensure that any future EHR is customizable and supports FOMC unique workflows. Importantly, the EHR should be interoperable with other clinic health IT and facilitate accomplishment of clinic workflows using a single user-system interface or presentation layer. The recommended capabilities and features for a new EHR system, discussed below, are based on the streamlined re-engineered workflows (Figure 29).

To ensure a robust EHR system is implemented, the EHR should adhere to the Health Level Seven (HL7) EHR Functional Model. The HL7 Model is a jointly balloted international standard that provides a reference list of functions and associated conformance criteria applicable to healthcare. It defines a standardized model of the functions that may be present in EHR systems. The model is not intended to be realm or care specialty specific, but allows for broad development capability since the model is platform agnostic.

While the HL7 model addresses EHR functionality, the realization of those functions at the level of workflows is primarily

Figure 29: Re-engineered Workflow Paradigm

determined by the usability of the EHR. Simply put, if a system has poor usability, the corresponding functions don't exist for the user. The Agency for Healthcare Research and Quality describes EHR usability in terms of three dimensions[2]:

- *Useful* refers to "how well the system supports the work domain where the users accomplish the goals for their work, independent of how the system is implemented." A system is useful if it contains the domain functions necessary and only those functions that are essential for the work. Useful is measured by the "percentage of domain functions in the EHR vs. all domain functions in the work domain and percentage of domain functions over all functions (domain and non-domain) in the EHR."

- *Usable* refers to whether a system "is easy to learn, easy to use, and error-tolerant." Usable may be measured by learnability, efficiency, and error tolerance.

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[2] Agency for Healthcare Research and Quality (AHRQ), EHR Usability Toolkit: Background Report on Usability and Electronic Health Records, AHRQ Publication No. 11-0084-EF, August 2011

a. Learnability is how quickly a new or novice user learns or relearns the user interface to conduct basic tasks. Learnability is dependent on the consistency of the interface and the ability of the interface to allow exploratory learning by including undo or cancel functions. It can be measured by the time it takes to learn a new task.

b. Efficiency is defined as the speed with which a user can complete a task or accomplish a goal. It is typically measured by the length of time required to complete a task, task success, number of keystrokes, and number of screens visited. Efficiency may also be measured by objective measures of mental effort, such as the percentage of mental steps over all steps (mental and physical).

c. Error tolerance refers to the ability of the system to help users avoid and recover from error.

- *Satisfying* consists of a set of subjective measures regarding a user's perception of a system's usefulness and impact, and how likable a system is. The main measures include instruments and interviews that may measure the users' perception of a system.

General Capabilities Summary

Overall FOMC EHR Needs:

1. Single user interface that integrates underlying applications and databases.
2. Supports standardization of workflows:
   - Templates that reflect policy (should build a customized template for each patient capturing all elements of the exam that are required based on policy, standards, and occupational risks and exposures)
   - Auto-population of templates with available data
   - Active querying to obtain missing data (e.g., generating tailored patient questionnaire)
   - Error checking against standards.
3. Supports user roles within workflow and teaming across roles (allows tasking and confirmation)
4. Recognizes patient as member of healthcare team (patient centered medicine) and has patient-facing and clinician-facing elements.
5. Portable to support workflows at location where work is performed (to include communications)
6. Population management functions – the unblinking eye that is tracking when events are due and proactively alerting patients and healthcare teams.

Ensuring a Usable and Useful Environment

Attending to overall EHR usability is absolutely necessary to fully mitigate many of the latent failures identified in the front end analysis. Foremost, the EHR needs to be useful for FOMC staff, which is achieved by ensuring EHR functionality supports all the tasks comprising FOMC-unique workflows. Given the FOMC staff receives minimal health IT training and experiences high turnover, it is imperative that the EHR is also highly usable in terms of being learnable and error tolerant. The majority of the staff is new to the FOMC and only works in the clinic for a single assignment. Typically, staff members are reassigned just at the point where they are mastering the FOMC workflows and associated health IT, which results in a clinic-wide dearth of expertise. Consequently, the EHR must reduce the learning curve by providing an intuitive interface so that staff can quickly utilize the system to its maximum capacity. One way to flatten the learning curve is by implementing standardized and consistent user interfaces throughout the system. Additionally, it must be anticipated that novice users will be prone to errors, and this likelihood should drive EHR mitigations such as embedded decision support and error checking functions. Lastly, given recurrent FOMC staffing shortfalls and growing pressure to improve productivity, the EHR must also address the usability attribute of efficiency by providing shortcuts for high frequency tasks, structured templates for standardized workflows (e.g., physical exams and

narrative summaries), and auto population where needed data is already resident in the system.

Below is a high-level view of recommended EHR functionality that aligns to the re-engineered workflows.

- The EHR has a set of business rules for population and exam management (e.g., identifying and tracking individuals due for a periodic occupational health assessment)
- The EHR has an alerting and notification capability that sends automatic alerts/notifications to appropriate individuals (e.g., service members, local unit leadership, FOMC staff, and accommodation authorities) based on business rules.
- The EHR identifies requirements for exam components based on individual specific information (i.e., health history) and business rules
- The EHR generates individualized questionnaires and templates based on general health history information and business rules and tailors questionnaires and forms based on real-time responses
- The EHR identifies missing data and automatically queries individuals for the respective data
- The EHR summarizes and displays results in customized, role-based views
- The EHR possesses automatic scheduling capability that identifies available time slots based on clinic resources and exam type and allows the individual to schedule, edit, or cancel an appointment.
- The EHR generates the role-specific exam templates for completion by members of the patient care team and highlights missing information and abnormal findings or results
- The EHR summarizes exam results and generates a care plan template for review and completion
- The EHR provides a summary of patient conditions and impairments
- The EHR collects metrics on speed, quality, and outcomes (i.e., processing time, lead time, defects, and patient satisfaction)

Conceptual Design

The conceptual designs are organized into three primary views: dashboard view for situational awareness, detailed role-based view for workflow specific transactional activities, and a reporting view to allow for default and customized reporting.

The EHR should include the following primary functions to support clinical staff cognitive processes:

- **Memory aid**: Reduces the need to rely on memory alone for information required to complete a task.
- **Computational aid**: Reduces the need to mentally group, compare, or analyze information.
- **Decision support aid**: Enhances the ability to integrate information from multiple sources to make evidence-based decisions.
- **Collaboration aid:** Enhances the ability to communicate information and findings to other providers and patients.

Dashboard View (Situational Awareness/Status)
The EHR dashboard view is used to display context-relevant information that is easy to read and navigate. Each feature on the dashboard serves an express purpose for the specific user, making it a personalized hub for situation awareness. The dashboard may vary depending on the user's information needs.

Role-Based View

The EHR role-based view is tailored to the user's role in a workflow (i.e., patient, technician, nurse/case manager, or provider.) This view supports standardization and organizes EHR functions to mirror the workflow so that system interactions are accomplished with economy of movement within the system interface. Information should be pushed to the user and corresponding, task-relevant system functions and decision support exposed to the user. The result is a fairly "flat interface" that both guides the novice user and supports efficient execution by the experienced user. Additionally, this view should support handoffs and teaming by directing taskings to relevant team members as well as tracking acceptance and accomplishment of tasks.

Reporting View

The EHR reporting view displays the clinic's current status and provides insight into current issues, population health and other patient data. From this view, users are able to create unique reports by pulling data directly from the EHR system.

EHR Scenario

The following EHR scenario walks through elements of an Initial Flying Class physical examination, starting with the patient completing the medical history questionnaire.

Role-Based View: Patient

Role-Based View: Patient

USER

MENU

LAST NAME, FIRST NAME, MIDDLE NAME	SOCIAL SECURITY NO. (LAST 4)				TODAY'S DATE (YYYYMMDD)
Smith, John E	5	5	5	5	2014/01/01

SERVICE	COMPONENT	POSITION (Title, Grade, Component)
AIR FORCE	REGULAR	
Info Incorrect	Info Incorrect	USUAL OCCUPATION

Medical History Questionnaire (Page 2 of 8)

Mark each item "YES" or "NO". Every item marked "YES" must be fully explained.

Have you ever had or do you currently have:

	YES	NO
a. Tuberculosis	☐	☒
b. Lived with someone who had tuberculosis	☐	☒
c. Coughed up blood	☐	☒
d. Asthma or any breathing problems related to exercise, weather, pollens, etc.	☒	☐
e. Shortness of breath	☐	☒
f. Bronchitis	☒	☐
g. Wheezing or problems with wheezing	☒	☐

<<BACK

NEXT>>

Role-Based View: Patient

5 New Alerts	Dashboard	Patient	Reporting		Log Off

USER   **MENU**

LAST NAME, FIRST NAME, MIDDLE NAME		SOCIAL SECURITY NO. (LAST 4)				TODAY'S DATE (YYYYMMDD)
Smith, John E		5	5	5	5	2014/01/01

SERVICE	STATUS	POSITION (Title, Grade, Component)
AIR FORCE	ACTIVE DUTY	
		USUAL OCCUPATION

[Info Incorrect]   [Info Incorrect]

Medical History Questionnaire (Page 4 of 8)

When were you first Diagnosed with Asthma?
Month/Year   Sept 2013
Age   25

Are you still being treated for condition/ do you still have symptoms?
Yes/No   YES   Explain   I still have symptoms

What were you doing when you initially had symptoms?
Running in the Gym

What medications or inhalers were you prescribed? (Need medication Name/dosage/freque...
Albuterol/ 2 puffs/ 15 mins before exercise

How long did you take the medications?
Still take Albuterol before exercising

<<BACK

> **3)** This airman answered **YES** to having "History of Asthma". Since the member answered Yes to a potentially disqualifying condition, the EHR generates additional questions.
>
> *The airman's progress for completing the medical history is visually depicted with the progress bar at the bottom of the screen.

Role-Based View: Technician

1 New Alerts	Dashboard	Patient	Reporting

SSgt Susan Williams, Technician, WPAFB

Tech

Appt Time	Patient	Start Date	Type of Appointment
0900	+Jane Doe	1/12/2013	Periodic Op Assessment
0915	+Bob Dylan	1/14/2013	Accommodation Flying Class
0930	+Sally Field	1/16/2013	Periodic Flying Class
1000	+Dillon Jones	1/18/2013	Accommodation/Restrictions
1045	+Mollie Wood	1/20/2013	Occ Health
1100	+Aniya Blue	1/22/2013	Pre-Placement

ACTION ITEMS

- Doe, Jane - Review Report
- Dylan, Bob - Review Report
- Field, Sally - Required Document
- Field, Sally - Document Pending Approval
- Jones, Dillon - Document Pending Approval
- Jones, Dillon - Review Report
- Smith, John – Case Review
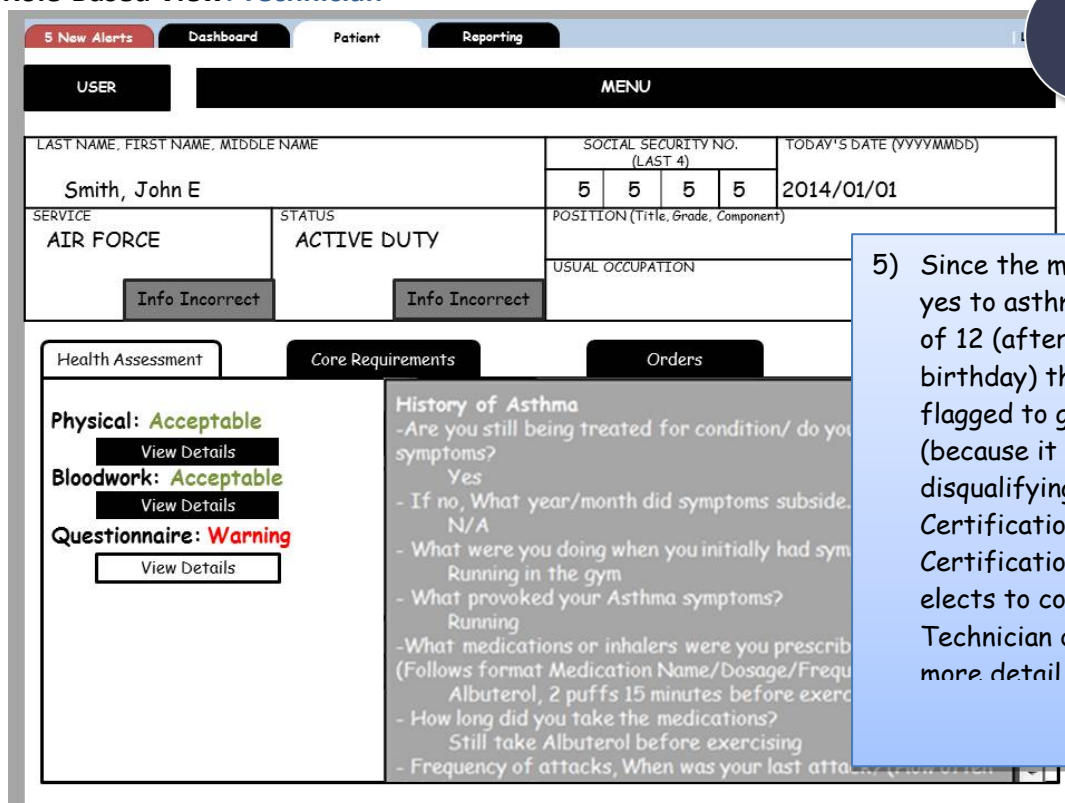- Wood, Mollie - Required Document

NEW ALERTS

☐ Smith, John - Case Updated - REVIEW

Notes

To Do : Check on Sally Fields required document.
Reminder: Talk with Dr. Stevens.

> **4)** The Technician is notified of updates via the Dashboard View and reviews patient's medical history.

Role-Based View: Technician

| 5 New Alerts | Dashboard | Patient | Reporting |

USER — **MENU**

LAST NAME, FIRST NAME, MIDDLE NAME

Smith, John E

SOCIAL SECURITY NO. (LAST 4)

| 5 | 5 | 5 | 5 |

TODAY'S DATE (YYYYMMDD)

2014/01/01

SERVICE
AIR FORCE

STATUS
ACTIVE DUTY

POSITION (Title, Grade, Component)

USUAL OCCUPATION

Info Incorrect   Info Incorrect

Health Assessment   Core Requirements   Orders

Physical: Acceptable
View Details
Bloodwork: Acceptable
View Details
Questionnaire: Warning
View Details

History of Asthma
-Are you still being treated for condition/ do you symptoms?
    Yes
- If no, What year/month did symptoms subside.
    N/A
- What were you doing when you initially had sym
    Running in the gym
- What provoked your Asthma symptoms?
    Running
-What medications or inhalers were you prescrib
(Follows format Medication Name/Dosage/Frequ
    Albuterol, 2 puffs 15 minutes before exerc
- How long did you take the medications?
    Still take Albuterol before exercising
- Frequency of attacks, When was your last attack?

5) Since the member responded yes to asthma after the age of 12 (after his 13th birthday) this information is flagged to go automatically (because it is a potentially disqualifying condition) to Certification Authority. The Certification Authority elects to continue and the Technician drills down for more detail.

6) The EHR will recognize that patient needs to have a Spirometry study done before scheduling the exam with the OM doc. The test will be scheduled through the EHR and it prevents the exam from being scheduled until after the required tests are accomplished.

Role-Based View: Patient

Role-Based View: Optometry

Role-Based View: OM Doc

Role-Based View: OM Doc

NARRATIVE SUMMARY
- DEMOGRAPHICS

        Name: Smith, John E   Rank: SrA   SSN: XXX-XX-5555   AFSC: 6F031

        Duty Title: XXXX   Status: AD   Separation Date: N/A   Administrative Actions: N/A

- HISTORY

        - Pertinent Past Medical History

            - Asthma, 2013, Active

        + Pertinent Past Surgical History

        + Pertinent Family History

- CURRENT MEDICATIONS
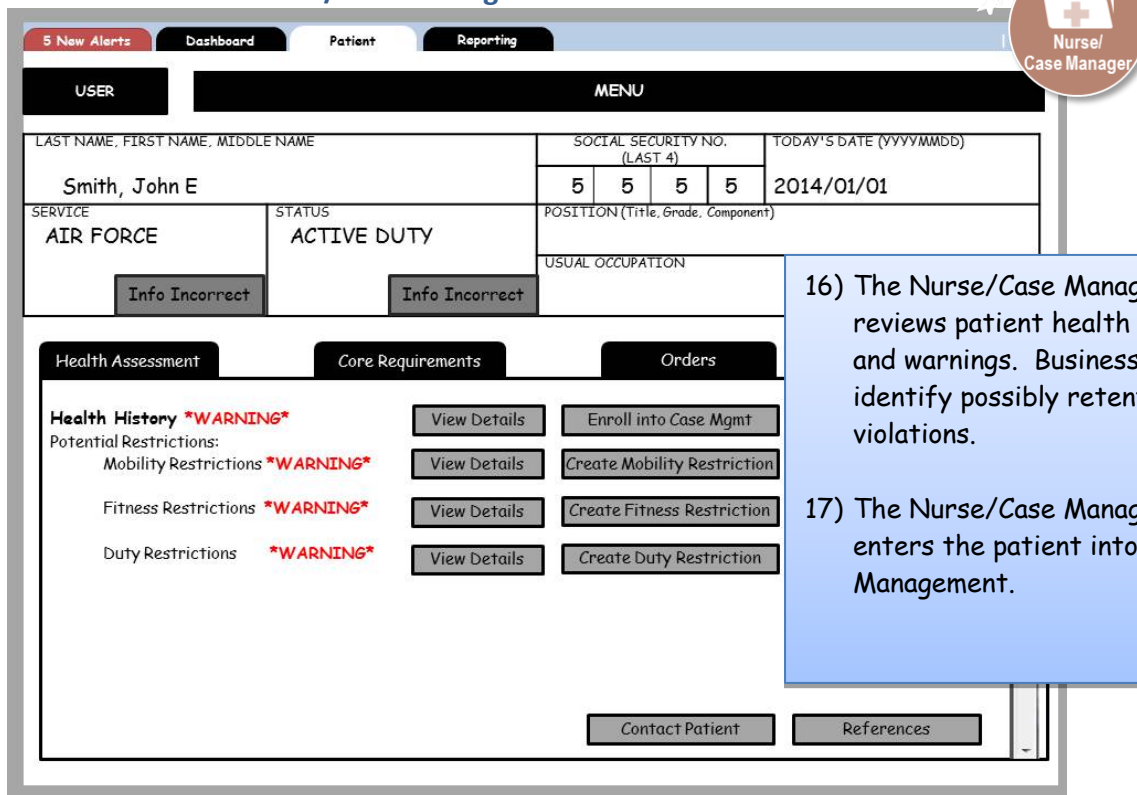
        Albuterol Inhaler – 2 puffs 15 minutes before exercise

+ HPI – POTENTIALLY UNFITTING DIAGNOS (ES)

+ TARGETED PHYSICAL EXAM

+ ANCILLARY STUDY SUMMARY

+ CONSULT SUMMARY

+ CURRENT PROFILE RESTRICTION

+ OCCUPATIONAL IMPACT

+ PROGNOSIS

Edit   Save   Submit

15) The OM Doc creates the Narrative Summary. The EHR automatically populates with the data that already resides in the system.

Role-Based View: Nurse/Case Manager

LAST NAME, FIRST NAME, MIDDLE NAME		SOCIAL SECURITY NO. (LAST 4)				TODAY'S DATE (YYYYMMDD)
Smith, John E		5	5	5	5	2014/01/01

SERVICE
AIR FORCE

STATUS
ACTIVE DUTY

POSITION (Title, Grade, Component)

USUAL OCCUPATION

Info Incorrect   Info Incorrect

Health Assessment   Core Requirements   Orders

Health History *WARNING*
Potential Restrictions:
        Mobility Restrictions *WARNING*   View Details   Enroll into Case Mgmt

        Fitness Restrictions *WARNING*   View Details   Create Mobility Restriction

        Duty Restrictions   *WARNING*   View Details   Create Fitness Restriction

                                View Details   Create Duty Restriction
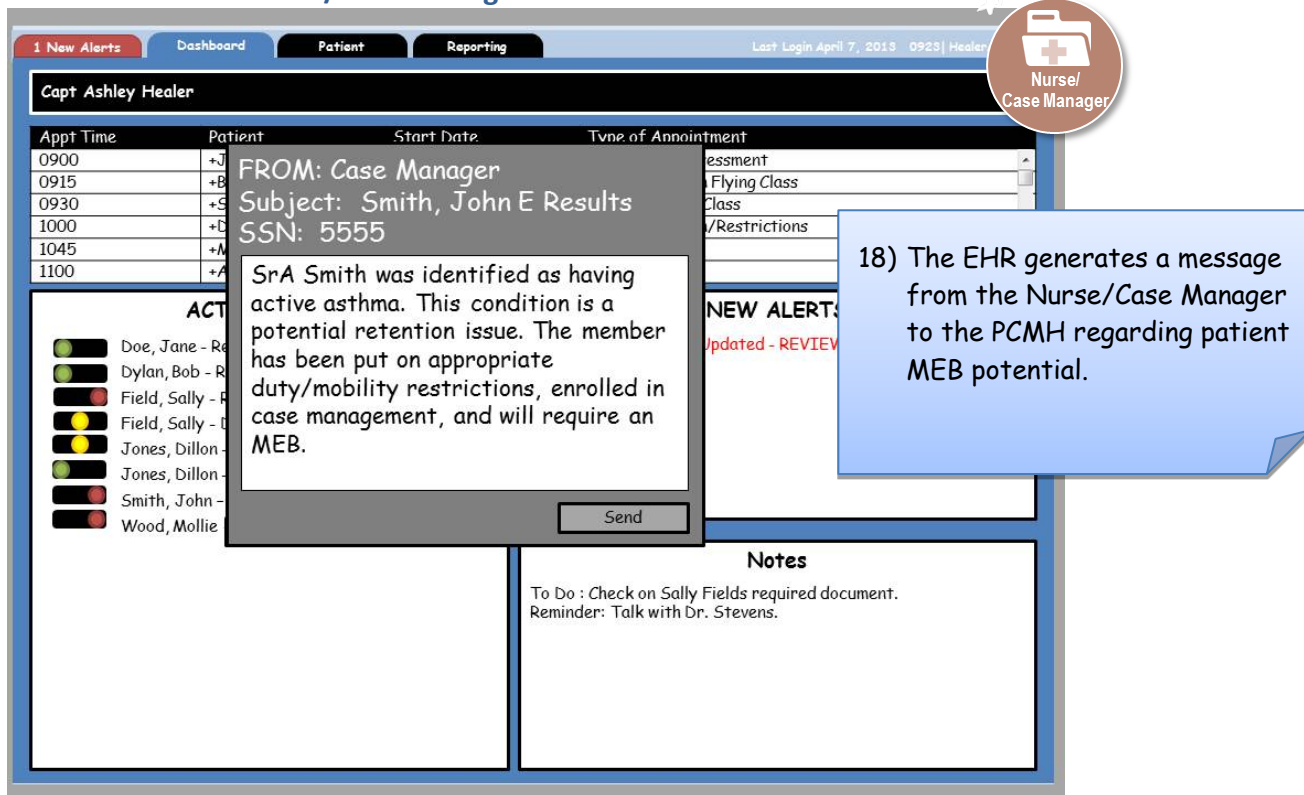
Contact Patient   References

16) The Nurse/Case Manager reviews patient health history and warnings. Business rules identify possibly retention violations.

17) The Nurse/Case Manager enters the patient into Case Management.

Role-Based View: Nurse/Case Manager

| 1 New Alerts | Dashboard | Patient | Reporting | Last Login April 7, 2013 0923| Healer |

Capt Ashley Healer

Appt Time	Patient	Start Date	Type of Appointment
0900	+J		essment
0915	+B		Flying Class
0930	+S		Class
1000	+D		/Restrictions
1045	+M		
1100	+A		

FROM: Case Manager
Subject: Smith, John E Results
SSN: 5555
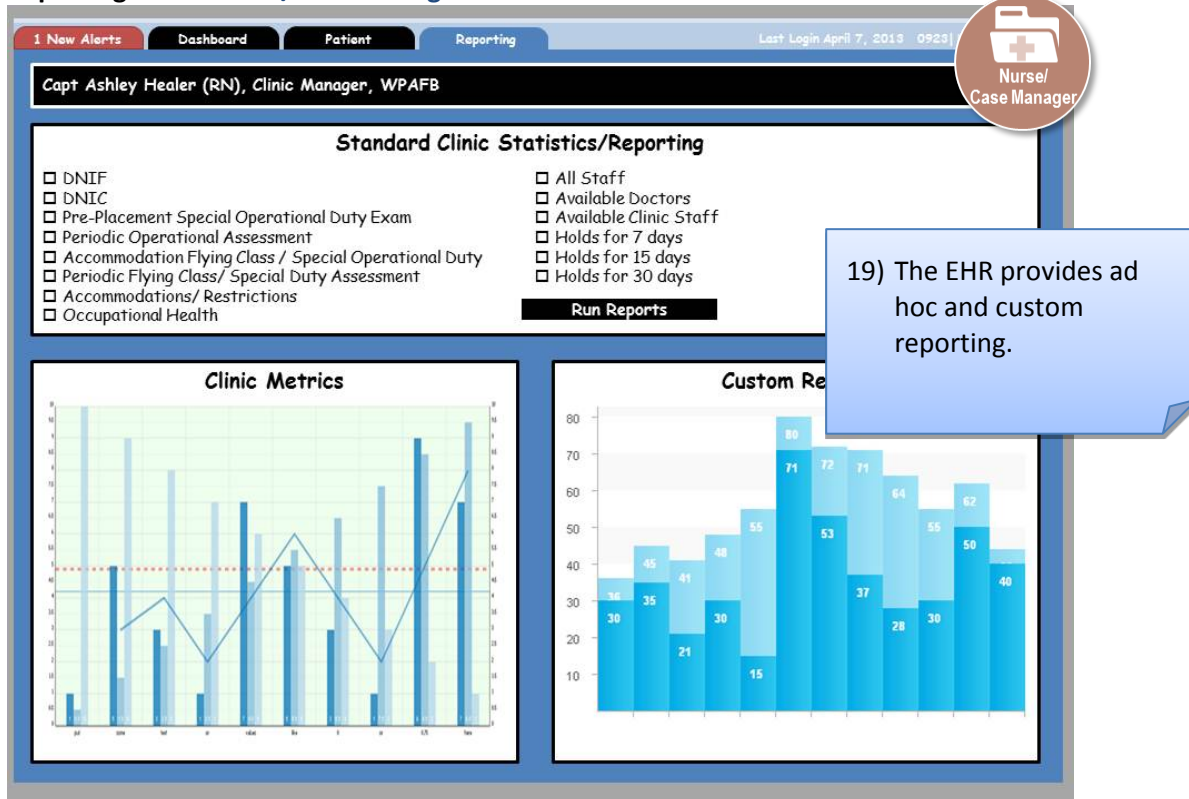
SrA Smith was identified as having active asthma. This condition is a potential retention issue. The member has been put on appropriate duty/mobility restrictions, enrolled in case management, and will require an MEB.

Send

ACT

- Doe, Jane - Re
- Dylan, Bob - R
- Field, Sally - F
- Field, Sally - D
- Jones, Dillon -
- Jones, Dillon -
- Smith, John -
- Wood, Mollie

NEW ALERTS

Updated - REVIEW

Notes

To Do : Check on Sally Fields required document.
Reminder: Talk with Dr. Stevens.

18) The EHR generates a message from the Nurse/Case Manager to the PCMH regarding patient MEB potential.

Reporting View: Nurse/Case Manager

| 1 New Alerts | Dashboard | Patient | Reporting | Last Login April 7, 2013 0923| |

Capt Ashley Healer (RN), Clinic Manager, WPAFB

Standard Clinic Statistics/Reporting

- ☐ DNIF
- ☐ DNIC
- ☐ Pre-Placement Special Operational Duty Exam
- ☐ Periodic Operational Assessment
- ☐ Accommodation Flying Class / Special Operational Duty
- ☐ Periodic Flying Class/ Special Duty Assessment
- ☐ Accommodations/ Restrictions
- ☐ Occupational Health

- ☐ All Staff
- ☐ Available Doctors
- ☐ Available Clinic Staff
- ☐ Holds for 7 days
- ☐ Holds for 15 days
- ☐ Holds for 30 days

Run Reports

Clinic Metrics

Custom Re

19) The EHR provides ad hoc and custom reporting.

Distribution A: Approved for public release, distribution unlimited. Release #88ABW-2014-1602, dated 11 April 2014

6 Appendix C: Health Information Technology (IT) Usability Survey

Introduction

According to HIMSS (Healthcare Information and Management Systems Society), usability has a strong, often direct relationship with clinical productivity, error rate, user fatigue and user satisfaction. Figure 30, taken from the HIMSS' (2011) *Promoting Usability in Health Organizations: Initial Steps and Progress Toward a Healthcare Usability Maturity Model*, illustrates the connection between health IT usability and patient, provider and organization outcomes. The clear inference is that health IT usability directly contributes to the AFMS strategic goals of Better Care, Better Health, and Best Value. However, issues with the usability of DoD's EHR and other health IT systems are well known among the clinical workforce. For this reason, the FOMC workflow analysis included a survey to measure the usability of five health IT systems embedded in the workflows: AHLTA, ASIMS, AIMWTS, PEPP, and AERO[3]. The purpose of this study was to access differences between the relative usability of the aforementioned health IT systems employed in the FOMC and assess differences in usability with regard to user age, years of experience with each system, location, and role.
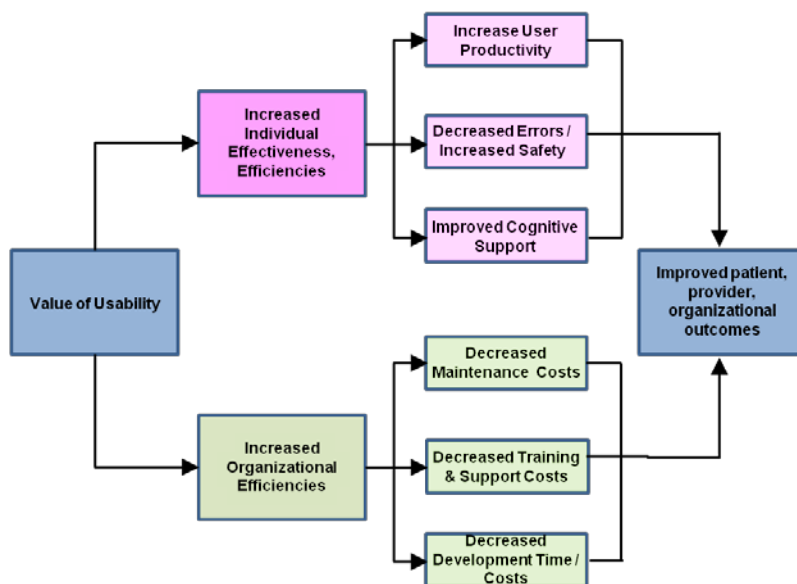
Figure 30: Value of Usability

Methods

Participants
The participants were a convenience sample of those FOMC staff at the six study locations who participated in the ethnographic data collection for the overall workflow analysis. Participants included administrative technicians, medical technicians, nurses, physician assistants, flight surgeons, and other physicians working in the FOMC.

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[3] AHLTA: Armed Forces Health Longitudinal Technology Application; ASIMS: Aeromedical Services Information Management System; AIMWTS: Aeromedical Information and Waiver Tracking System; PEPP: Physical Exam Processing Program; AERO: Aeromedical Electronic Resource Office.

Instrument

The survey was adapted from the work done by Jakob Nielson[4,5] on standard usability principles (heuristics). The survey consisted of 21 statements (items) that were grouped into four usability constructs: 1) ease of use (5 items), 2) job support and usefulness (5 items), 3) consistency (7 items), and 4) system generalities (5 items). Ease of use evaluated perceived ease of learning, interacting with, and navigating the system. Job support and usefulness pertained to enhancing job performance, productivity, and effectiveness. Consistency measured the users' impression of the consistency across display formats, feedback, data fields, entry requirements, and wording. System generalities measured system performance speed, feedback, expected options and icon use.

Participants assessed each item using a 5-point Likert-type[6,7] scale where "strongly disagree" was scored as a 1 and "strongly agree" was scored as a 5. Participants were asked to individually rate every item as it pertained to each health IT system. The survey also collected data on age (18-29, 30-49, >49), experience-level in years (<1, 1-5, >5), role (technician, physician assistant, nurse, or flight surgeon), and location. The survey included 21 items for each of the five health IT systems. If a participant answered less than 21 questions for that system their responses for that system were excluded.

Statistical Analysis

All statistical analyses were accomplished using SAS version 9.3 (SAS Institute, Inc., Cary, NC). Each construct was evaluated for internal consistency using Cronbach's α coefficient. Analysis of covariance was used to assess the relationship between the usability summative score, and each of the following independent variables: age, years of experience with the health IT system, and location. Alpha was set at the 0.05 level.

Results

Participants

A total of 72 participants from the six study sites completed the survey. Ten participants were excluded from the study due to incomplete responses within all health IT systems. Of the 62 remaining participants, 37% were 18-29 years of age, 47% were 30-49, and 8% were >49. Due to small counts, physician assistants (n=3) and other physicians (n=1) were grouped with flight surgeons (n=17) as providers (n=21; 34%); administrative (n=1) and medical technicians (n=33) were grouped as technicians (n=34; 55%). The remaining seven participants were nurses (11%). Over half of the participants indicated they had 1-5 years of experience with the systems, 29% had less than 1 year, and 18% had more than 5 years. Locations were masked (Base 1- Base 6). The number of participants at each location ranged from 7 at Base 6 (11%) up to 14 participants at Base 4 (23%). Table 8 provides a summary of the demographic data.

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[4] Nielsen, J. (1994). Heuristic evaluation. In Nielsen, J., and Mack, R.L. (Eds.), *Usability Inspection Methods*. John Wiley & Sons, New York, NY

[5] Nielsen, J. (1995). 10 Usability Heuristics for User Interface Design. Nielson Normal Group, available at http://www.nngroup.com/articles/ten-usability-heuristics/

[6] Carifio, J and Perla, R. 2007. Ten common misunderstandings, misconceptions, persistent myths and urban legends about Likert scales and Likert response formats and their antidotes. Journal of Social Sciences 3(3): 106-116.

[7] Boone, H and Boone D. 2012. Analyzing Likert Data. Journal of Extension 50(2). Available at: http://www.joe.org/joe/2012april/tt2.php.

Demographic	N	Percent
Overall	62	100
Age		
18-29	23	37.10
30-49	29	46.77
>49	5	8.06
Unknown	5	8.06
Role		
Technician	34	54.84
Provider	21	33.87
Nurse	7	11.29
Experience (yrs.)		
<1	18	29.03
1-5	33	53.23
>5	11	17.74
Location		
Base 4	14	22.58
Base 5	13	20.97
Base 2	13	20.97
Base 1	9	14.52
Base 3	7	11.29
Base 6	6	9.68

Survey Response Characteristics

Responses for each of the four constructs indicated high internal consistency: 1) ease of use (α=0.89); 2) job support and usefulness (α=0.99); 3) consistency (α=0.99); and 4) system generalities (α=0.86). Overall, the survey demonstrated strong reliability (α=0.96), indicating that the items were measuring the same construct. Consequently, summative scores were used in lieu of scores for each of the four constructs. The range of possible scores for each health IT system was 21 up to 105, where higher scores indicated better usability.

Relationship between Usability Scores for Health IT Systems and Independent Variables

For all health IT systems, the mean score was higher than the midpoint of the score range (Table 9). In an analysis of covariance main effects model (model with all covariates) age and role were not significant. The reduced model indicated that years of experience, location, and IT health system appeared to influence the usability score ($F_{11,183}$ = 5.92, p = <0.0001). Table 10 presents the ANOVA source table. To show how IT health systems differed in usability score, an adjusted least squared means (means that were adjusted for the covariates experience and location) and the 95% confidence intervals for health IT systems were calculated (presented in Figure 31). The confidence intervals do not overlap for AHLTA compared to AIMWTS and ASIMS, suggesting there was a significant difference between their mean scores.

Table 9: Summary scores for respondent demographic data by health IT system

		AERO					AHLTA					AIMWTS					ASIMS					PEPP			
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Overall	9	68.44	21.94	21	100	59	67.36	17.80	22	105	43	75.65	13.55	47	105	52	77.04	15.54	39	105	32	72.69	15.11	39	105
Age																									
18-29	1	85.00	-	85	85	23	72.35	13.32	46	96	16	76.75	12.05	47	96	21	76.95	15.56	39	105	13	76.92	14.41	39	100
30-49	5	61.00	23.70	21	81	27	63.22	14.97	29	92	23	74.30	13.48	49	105	24	73.63	13.21	45	105	16	72.63	14.45	49	105
>49	1	63.00	-	63	63	4	49.25	14.03	32	63	2	74.00	21.21	59	89	2	93.00	16.97	81	105	1	59.00	-	59	59
Unknown	2	81.50	26.16	63	100	5	81.20	34.43	22	105	2	84.00	29.70	63	105	5	87.40	21.45	53	105	2	52.50	14.85	42	63
Role																									
Technician	6	70.83	27.26	21	100	33	72.67	13.55	46	100	25	76.76	12.82	47	105	32	78.16	14.51	39	105	21	74.05	15.08	39	100
Provider	2	65.50	3.54	63	68	19	58.32	17.94	29	92	15	74.47	15.47	49	105	14	76.43	17.75	45	105	9	72.00	16.71	49	105
Nurse	1	60.00	-	60	60	7	66.86	26.48	22	105	3	72.33	12.86	63	87	6	72.50	17.46	53	100	2	61.50	2.12	60	63
Experience (yrs.)																									
<1	2	74.00	15.56	63	85	17	75.18	16.66	49	105	11	82.64	12.51	63	105	15	84.33	13.41	69	105	8	80.13	13.87	63	105
1-5	3	76.00	21.17	60	100	32	65.75	16.49	22	100	24	75.17	13.52	47	105	29	74.07	15.78	39	105	17	73.35	16.22	39	100
>5	4	60.00	27.06	21	81	10	59.20	20.29	29	88	8	67.50	11.17	49	87	8	74.13	15.59	45	96	7	62.57	7.70	49	71
Location																									
Base 4	1	85.00	-	85	85	12	71.42	23.26	22	96	10	87.90	8.57	74	105	12	85.17	14.48	53	105	9	86.56	11.38	69	105
Base 5	5	61.60	23.70	21	81	12	69.92	14.57	44	99	7	67.14	4.95	59	72	10	80.20	10.84	69	99	5	65.20	5.85	59	71
Base 2	3	74.33	22.28	60	100	13	64.54	13.85	44	100	10	71.30	13.60	62	105	11	71.45	13.24	59	105	6	63.67	13.69	42	84
Base 1	-	-	-	-	-	9	61.67	18.55	45	96	8	71.63	19.22	47	96	8	66.63	23.13	39	105	6	64.33	17.95	39	84
Base 3	-	-	-	-	-	7	64.57	24.47	29	105	3	78.67	8.50	70	87	5	81.00	14.32	62	100	3	77.67	10.07	67	87
Base 6	-	-	-	-	-	6	72.00	10.75	55	88	5	76.40	6.23	72	87	6	76.33	9.48	67	88	3	73.33	8.96	63	79

Table 10: Source table for reduced main effects model

Source	DF	Type III SS	Mean Square	F Value	p-value
Experience	2	4287.50	2143.75	10.13	<.0001
Location	5	5503.36	1100.67	5.20	0.0002
System	4	3114.54	778.64	3.68	0.0066
Error	183	38736.12	211.67	N/A	N/A

Figure 31: Adjusted Least Squared Means for System
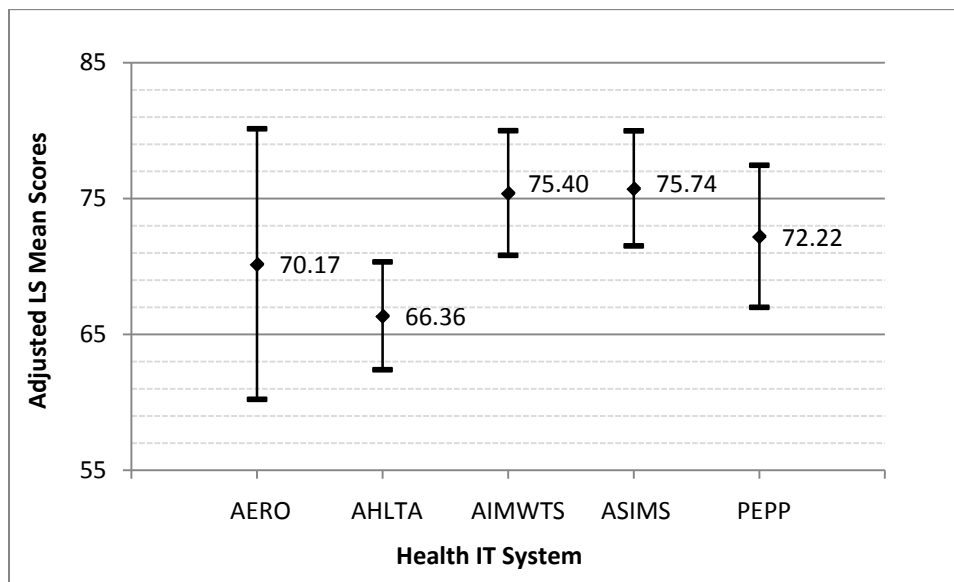
Conclusions

FOMC staff rated the usability of AIMWTS and ASIMS as being significantly better than AHLTA. There was no difference in the usability of the Air Force physical exams and waiver systems (PEPP and AIMWTS respectively) and the Army/Navy combined physical exams and waiver system (AERO). There was no difference in the usability of the Army/Navy AERO system and AHLTA, the latter being a benchmark for suboptimal usability based on national EHR surveys. While a similar pattern was observed for the Air Force's physical exams system (PEPP), the usability of the Air Force's waiver system (AIMWTS) was significantly better than AHLTA. These observations should be taken into consideration should a future decision be made on consolidating DoD physical exams and waiver systems.

7 Appendix D: DoD HFACS Model

Organizational Influences
- Resource/Acquisition Management
- Organizational Climate
- Organizational Process

Supervision
- Inadequate Supervision
- Planned Inappropriate Operations
- Failure to Correct Known Problem
- Supervisory Violations

Preconditions
- Environmental Factors
  - Physical Environment
  - Technological Environment
- Condition of Individuals
  - Cognitive Factors
  - Psycho-Behavioral Factors
  - Adverse Physiological States
  - Physical/Mental Limitations
  - Perceptual Factors
- Personnel Factors
  - Coordination/Communication/Planning Factors
  - Self-Imposed Stress

Acts
- Errors
  - Skill-Based Errors
  - Judgment and Decision-Making Errors
  - Misperception Errors
- Violations

8 Appendix E: Acronyms

4C	Mental Health
4E	Public Health Technician
4F	Flight Medicine Technician
4N	Medical Technician
4Y	Dental Health
AD	Active Duty
AERO	Aeromedical Electronic Resource Office
AFCITA	Air Force Complete Immunization Tracking Application
AFI	Air Force Instructions
AFMAN	Air Force Manual
AFMS	Air Force Medical Service
AFPC	Air Force Personnel Center
AFPD	Air Force Policy Directive
AFSC	Air Force Specialty Code
AHLTA	Armed Forces Health Longitudinal Technology Application
AIMWTS	Aeromedical Information and Waiver Tracking System
AMC	Aerospace Medicine Council
AME	Aerospace Medicine Enterprise
AMS	Aeromedical Summary
AOR	Area of Responsibility
ARMA	Adaptability Rating Military Aviation
ASIMS	Aeromedical Services Information Management Systems
CAC	Common Access Card
CC	Commander
CHCS	Composite Health Care System
CM	Case Manager
CMA	Competent Medical Authority
CO	Commanding Officer
COHER	Clinical Occupational Health Exam Requirements
DAWG	Deployment Availability Working Group
DNIC	Duty Not Involving Controlling
DNIF	Duties Not Involving Flying
DO	Duty Officer
DoD	Department of Defense
DOTMLPF-P	Doctrine, Organization, Training Materiel, Leadership, Personnel, Facilities, Policy
DPAM	Air Force Personnel Center, Medical Standards Department or Medical Officer Management
DQ	Disqualification

DRA	Deployment Readiness Assessment
EHR	Electronic Health Record
FEA	Front End Analysis
FLT/CC	Flight Commander
FOMC	Flight and Operational Medicine Clinic
FOMP	Flight and Operational Medicine Program
FOMT	Flight and Operational Medicine Technician
FOMWG	Flight and Operational Medicine Working Group
FS	Flight Surgeon
GMO	General Medical Officer
HARMS	Host Aviation Resource Management
HFACS	Human Factors Analysis and Classification System
HIMSS	Healthcare Information and Management Systems Society
HIT	Health Information Technology
HL7	Health Level Seven
HSI	Human Systems Integration
IDES	Integrated Disability Evaluation System
IDMT	Independent Duty Medical Technician
IFC	Initial Flying Class
IMR	Individual Medical Readiness
IT	Information Technology
JCIDS	Joint Capabilities Integration and Development System
MAJCOM	Major Air Command
MDG/CC	Medical Group Commander
METALS	Mission Essential Task / Activities for Line Support
MPF	Military Personnel Flight
MSME	Medical Standards Management Element
NAVMED	Navy Medicine
NCOIC	Noncommissioned Officer In Charge
OB/Gyn	Obstetrics and Gynecology
OEHWG	Occupational and Environmental Health Working Group
OM	Occupational Medicine
PA	Physician Assistant
PCM/PCMH	Patient Centered Medical Home
PCS	Permanent Change of Station
PDI	Potentially Disqualifying Information
PEBLO	Physical Evaluation Board Liaison Officers
PEPP	Physical Exam Processing Program
PHA	Periodic Health Assessment

PHWG	Public Health Working Group
PIMR	Preventive Health Assessment and Individual Medical Readiness
POC	Point Of Contact
PRP	Personnel Reliability Program
PSP	Personnel Security Program
RAM	Residency in Aerospace Medicine
RPA	Remotely Piloted Aircraft
RTD	Return to Duty
RTFS	Return To Flying Status
RVU	Relative Value Units
SAS	Statistical Analysis Software
SGP	Senior Aerospace Medicine Physician
SME	Subject Matter Expert
SPO	System Program Office
SQ/CC	Squadron Commander
SURVIAC	Survivability / Vulnerability Information Analysis Center
TIM	Technical Interchange Meetings
UDM	Unit Deployment Manager
UFPM	Unit Fitness Program Manager
WebHA	Web Health Assessment

9 Appendix F: References

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